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Acculturation and the Association to Alcohol Use and Contraception Decisions in Hispanic Women

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Acculturation and the Association to Alcohol Use and Contraception Decisions in Hispanic Women

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Dedication

This dissertation is dedicated to my son, Grayson, and my late grandmother Mercedes Bejarano. Grayson, being your mom is my greatest joy and privilege. I am so proud of the gentleman you are becoming and am so grateful for your love, understanding, and support throughout this process. Thank you! And, to my angel in heaven, thank you for teaching me the value of hard work and perseverance. Your example influenced me in more ways than I ever thought possible.

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Abstract

Acculturation and the Association to Alcohol Use and Contraception Decisions in Hispanic Women

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Abstract: Prenatal exposure to substances of abuse is a significant public health problem in the United States. Alcohol use among women has increased over the past decade and the gender gap between men and women related to drinking continues to narrow, creating the potential for alcohol-related, adverse health effects, including alcohol-exposed pregnancy. Furthermore, there appears to be a change in drinking patterns when it comes to Hispanic women who are more highly acculturated. Despite this, few studies have examined the association between acculturation levels and decisions about alcohol and contraception use. This study utilizes the transtheoretical model of behavior change, the social cognitive model, and the social ecological model to understand the most relevant individual and systemic elements that affect behavior change. The current study analyzes data from a parent study, two-group randomized clinical trial of 261 women of reproductive age receiving services in primary care clinics receiving either CHOICES Plus or Brief Advice. The results showed differences between alcohol and contraception use outcomes for Hispanic versus non-Hispanic women. Repeated measures ANOVA revealed that acculturation was also associated with differences in some of the transtheoretical

model constructs. Further research should explore differences in acculturation among Hispanic subgroups. The data also support existing literature that suggests the need for components of interventions to be adapted based on ethnicity and level of acculturation.

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Chapter 1: Introduction

STATEMENT OF THE PROBLEM

Prenatal exposure to substances of abuse is an important public health concern in the United States (U.S.) and worldwide. Women of reproductive age commonly use substances such as alcohol and tobacco which can contribute to many pregnancy complications, deleterious developmental effects on the fetus, and increased rates of morbidity and mortality (Minnes, Lang, & Singer, 2011). According to the 1996 Institute of Medicine (IOM) report to Congress alcohol produces the most serious neurobehavioral effects in the fetus, considerably more so than other substances of abuse such as heroin, cocaine, and marijuana (Stratton, Howe, & Battaglia, 1996). An alcohol-exposed pregnancy (AEP) occurs when a woman who is not effectively using contraception consumes alcohol during pregnancy, regardless of whether she is aware of the pregnancy (M. Velasquez, Ingersoll, Sobell, & Sobell, 2016). The most severe effects of fetal alcohol exposure have been associated with heavy use of alcohol, including binge drinking (Tan, Denny, Cheal, Sniezek, & Kanny, 2015). Exposure to alcohol in-utero is associated with an increased risk of fetal alcohol spectrum disorders (FASDs) which may produce lifelong physical, behavioral, and intellectual disabilities (Manning & Hoyme, 2007). Similarly, the relationship between tobacco use during pregnancy and low birth weight, preterm birth, stillbirth and miscarriage is well established (Rogers, 2009). Smoking during and after pregnancy is also considered a risk factor for Sudden Infant Death Syndrome (SIDS) (Tong et al., 2013). Despite the decrease in overall smoking prevalence in the U.S., very light smoking (defined as 5 cigarettes or less per day) has increased, particularly among young women between the ages of 18 and 25 (Li, Holahan, & Holahan, 2015). Additionally, studies have shown that women who

smoke are more likely to drink alcohol during pregnancy than non-smokers (Ethen et al., 2009), creating the potential for a negative combined effect on the fetus (Velasquez et al., 2017).

FASD is a broad term used to describe the spectrum of conditions associated with prenatal alcohol exposure (PAE) (Riley, Infante, & Warren, 2011). Such conditions include, the physical, cognitive, and developmental problems caused when a woman drinks alcohol during pregnancy. There are an estimated 40,000 children who are born with an FASD each year in the U.S. (Sokol, Delaney-Black, & Nordstrom, 2003). The costs related to FASD are vast and have a deep impact on individuals, families, communities, and society at-large. While economic variables can often overshadow the depth and breadth of the human experience, in the case of prevention, these figures can assist in illustrating the scope of the problem. For example, the lifetime cost of care for an individual affected by an FASD has been estimated to be as high as $2 million per individual (Green, McKnight-Eily, Tan, Mejia, & Denny, 2016). In the U.S., the annual costs are estimated near $4 billion (Lupton, Burd, & Harwood, 2004), making the prevention of FASD a significant public health priority.

The prevalence of smoking has declined by over 50% since the 1960s (Fiore & Baker, 2011). In 2015, approximately 15.1% of adults in the U.S. were considered current smokers, down from 20.9% in 2005. Despite overall decreases, smoking remains the leading preventable cause of death in the U.S., responsible for over 480,000 deaths annually. Although current smokers are more likely to be male (16.7%), over 13% of women currently smoke cigarettes (Warren, Alberg, Kraft, & Cummings, 2014). Many, but not all, women quit smoking when they realize they are pregnant. It is estimated that 12% - 15% of women smokers continue to smoke during pregnancy (Keegan, Parva, Finnegan, Gerson, & Belden, 2010). Smoking during pregnancy has been shown to be more common among women of low socioeconomic status

(Hiscock, Bauld, Amos, Fidler, & Munafò, 2012) and in women with higher levels of tobacco dependence (Hettema & Hendricks, 2010). In a 2010 study, Dietz and colleagues suggested that approximately $232 million per year in health care costs could be saved by preventing smoking during pregnancy (Dietz et al., 2010).

Health care and community settings that women are likely to frequent offer excellent opportunities for talking to women about alcohol use and pregnancy and delivering evidence-based prevention interventions (Floyd et al., 2007; Ingersoll et al., 2005; Velasquez et al., 2010). In the 40-plus years since fetal alcohol syndrome (FAS) first appeared in the literature, a great deal of attention has been paid to the issue (Riley et al., 2011). While the majority of studies are epidemiological in nature, there is a growing body of evidence on prevention and intervention strategies to address this public health concern. Traditional alcohol screening and brief intervention has been utilized in primary care settings for many decades (McCambridge & Cunningham, 2014). While this intervention has been shown to reduce the risk of an AEP, it does not explicitly address both of the outcomes associated with an AEP – risky alcohol use and ineffective contraception. The CHOICES intervention described in Chapter 2 offers a more comprehensive approach to AEP prevention by offering intervention at both levels (Velasquez et al., 2010).

CONCEPTUAL MODEL

Decisions about health-related behaviors are heavily influenced by personal attributes such as personality (Lauriola, Russo, Lucidi, Violani, & Levin, 2005) social cognitive processes (Armitage & Conner, 2000), and the environment (Yen & Syme, 1999). Existing research provides a framework for understanding the relationship between sociodemographic, cultural, and individual factors; however, the overlap and connectedness of the concepts aren't often

explored. As a result, three theoretical models were chosen to serve in an integrated and somewhat overlapping manner to explain the comprehensive elements involved in health decisions, particularly those affecting women of reproductive age. The current study takes into account the interplay between three theoretical models, the Transtheoretical Model (TTM) of Behavior Change, Social Learning/Social Cognitive Theory (SCT), and the Social Ecological Model (SEM) and the influence of their major constructs in decision making regarding alcohol and contraception use.

All of the prevention interventions, described in subsequent chapters of this paper, are informed by the TTM. The TTM, a cross-cutting and integrated model, posits that individual behavior change occurs through a series of cyclical stages (Prochaska, 2013). The fundamental Stages of Change construct guides the direction and extent of the intervention. For example, in CHOICES, the professional delivering the intervention has quite a few options based on the Stage of Change and motivation expressed by the client (Velasquez, von Sternberg, & Parrish, 2013). The Stages of Change provide a context for understanding how best to work with a client given their readiness to change, level of motivation, and innate ability to make the most appropriate decisions based on their unique circumstances rather than through a one-size-fits-all approach.

Although the TTM seems to be the most relevant theory associated with the topic of prevention of AEPs based on the empirical evidence, two additional theories will be incorporated due to their overall relevance in explaining the multifaceted issue of health behavior change, particularly given their use in previous health behavior studies with Hispanic women. These are Social Cognitive Theory (SCT) and the Social Ecological Model (SEM). SCT explores the relationship an individual has with health practices while also acknowledge the interplay

between the individual and the environment (Bandura, 1998). Lastly, SEM considers a wider sphere of environmental influences, including the political milieu (Golden, 2012). Continued testing, evolution, and adaptation of these models may address current gaps in the knowledge base, particularly as they pertain to services delivered to culturally diverse, underrepresented, and disenfranchised groups.

PURPOSE OF THE STUDY

A number of evidence-based interventions exist that may be used with women of reproductive age who may be at risk of an AEP, including CHOICES, CHOICES Plus, and alcohol Screening and Brief Intervention (SBI). Previous research has included women from varied groups, including racial and ethnic minorities. These women were recruited from diverse settings and were also diverse in terms of other demographic characteristics such as marital status, employment status, and socioeconomic and income levels (Ingersoll et al., 2005; Montag, Clapp, Calac, Gorman, & Chambers, 2012; O'Connor & Whaley, 2007; Sharpe & Velasquez, 2008; Velasquez et al., 2017). Despite the wide representation of participants across most of the studies, few have focused exclusively on certain large minority groups, such as Hispanic women of reproductive age. The purpose of this study was to examine how acculturation factors such as language use, media, and ethnic social relations (Marin, Sabogal, Marin, Otero-Sabogal, & Perez-Stable, 1987) may influence drinking patterns and decisions about contraception among Hispanic women of reproductive age. One of the study's guiding hypotheses is that higher levels of acculturation will be associated with higher rates of baseline alcohol consumption, creating increased risk of an AEP in Hispanic women. This study also explored the relationship between temptation to use alcohol, temptation to not use contraception and confidence to not use alcohol and confidence to use contraception. Data from a randomized controlled study, Project

CHOICES Plus, was analyzed to provide information on the effect of ethnicity (Hispanic versus non-Hispanic) and level of acculturation on alcohol and contraception use, the primary outcome variables in the Project CHOICES Plus study. A secondary outcome that was explored was tobacco use. As the racial and ethnic composition of the U.S. continues to change – both within and between groups – it is important to consider how acculturation levels may affect health-related decision-making. The data utilized in this study included both the intervention and control arms of the parent CHOICES Plus study.

SPECIFIC AIMS AND RESEARCH QUESTIONS

Specific Aim 1: Describe the study sample.

Research questions for Aim 1:

1. How does the study sample of Hispanic women differ from the non-Hispanic women in terms of demographics, level of acculturation, smoking status, and baseline drinking?

Hypotheses:

   1. Hispanic women will report less alcohol use (drinks per week) than non-Hispanic women.
   2. The number of Hispanic women who report that they are current smokers will be fewer than non-Hispanic women.
   3. Hispanic women will be more likely to be married or living with a partner than non-Hispanic women.
   4. Hispanic women will be less acculturated than non-Hispanic women.

2. What are the alcohol use reduction outcomes (drinks per week) of Hispanic women versus non-Hispanic women in the study sample over time?

Hypothesis:

1. Hispanic women will have greater reductions in alcohol use over time when compared to non-Hispanic women.

3. What are the contraceptive use outcomes (ratio of protected days/days of sex) of Hispanic women versus non-Hispanic women in the study sample over time?

Hypothesis:

1. Hispanic women will have fewer reductions in contraception use over time when compared to non-Hispanic women.

4. How does the study sample of Hispanic women differ from the non-Hispanic women with regard to BSI symptom scales for anxiety, depression, and somatization over time?

Hypothesis:

1. Hispanic women will have higher scores on the BSI subscales for anxiety, depression, and somatization.

Specific Aim 2: Examine relationships between acculturation and mental health status as measured by the BSI symptom scales for anxiety, depression, and somatization.

Research question for Aim 2:

1. What is the relationship between acculturation and mental health status as measured by the BSI symptom scales for anxiety, depression, and somatization?

Hypotheses:

1. Lower levels of acculturation are associated with higher anxiety, depression, and somatization subscale scores on the BSI.

Specific Aim 3: Examine relationships between acculturation and TTM constructs.

Research question for Aim 3:

1. What is the relationship between acculturation and the TTM constructs: experiential and behavioral processes of change; decisional balance (pros and cons for change); temptation; and confidence for alcohol, tobacco, and contraception use?

Hypotheses:

1. Women who are highly acculturated will report more use of TTM experiential and behavioral processes of change for tobacco, alcohol, and contraception use over time than women who are less acculturated.
2. Women who are highly acculturated will report more temptation to use alcohol over time than women who are less acculturated.
3. Women who are highly acculturated will report more temptation to use tobacco over time than women who are less acculturated.
4. Women who are highly acculturated will report more temptation to not use contraception than women who are less acculturated.
5. Women who are highly acculturated will report less confidence about making changes related to alcohol use over time than women who are less acculturated.
6. Women who are highly acculturated will report less confidence about making changes related to tobacco use over time than women who are less acculturated.
7. Women who are more acculturated will report less confidence about making changes related to use of effective contraception over time than women who are less acculturated.

Chapter 2: Literature Review

The use of alcohol among women increased from 53% to 69% between 2001-2002 and 2012-2013 (Grant, Chou, Saha, & et al., 2017). Moreover, high-risk drinking [defined by the National Institute of Alcohol and Alcoholism (NIAAA) as 4 or more drinks on any single day at least once per week] (Dawson, Grant, Stinson, & Zhou, 2005) and alcohol use disorders (AUDs) also increased during the same time period, elucidating the potential for alcohol-related, adverse health effects, including alcohol-exposed pregnancy (AEP). The current body of literature clearly demonstrates the effectiveness of prevention interventions, such as CHOICES Plus, in reducing AEP. Despite this, few studies have focused on Hispanic women and the ways in which sociodemographic and cultural factors may affect decision making about alcohol, tobacco, and contraception use. Chapter 2 explores the central constructs associated with the prevention of AEPs beginning with a definition of AEP and FAS/FASD followed by a discussion of women and substance use, racial/ethnic differences, and risk factors. The next section provides an overview of evidence-based prevention of AEP, including relevant interventions. Finally, Chapter 2 describes the three theoretical frameworks that were used as a basis for conceptualizing the problem of AEP.

Alcohol-Exposed Pregnancy Defined

An alcohol-exposed pregnancy (AEP) occurs when a woman consumes alcohol during pregnancy, regardless of whether she is aware of the pregnancy (Velasquez et al., 2016). There is no known safe amount of alcohol that can be consumed during pregnancy, regardless of type or gestation period (Tan et al., 2015). The most severe effects of fetal alcohol exposure have been associated with heavy use of alcohol, including binge drinking (May et al., 2008; May &

Gossage, 2011). According to the Centers for Disease Control and Prevention (CDC), a non-pregnant woman who drinks more than 7 standard drinks in one week or more than 3 standard drinks in one day is at an elevated risk of an AEP. In the U.S., a standard drink is defined as a beverage containing 14 grams of pure ethanol. This amount corresponds to the alcohol contained in a 5-ounce glass of wine, a 12-ounce beer, 8-9 ounces of malt liquor, or 1.5 ounces of 80 proof spirits (Centers for Disease Control and Prevention, 2014). Consuming alcohol during pregnancy can lead to a number of teratogenic effects.

A teratogen is a substance or condition that can cause abnormal fetal development, also called birth defects, when introduced during pregnancy (Riley et al., 2011). There are numerous types of teratogens, including viruses, infections, drugs, chemicals, malnutrition, and other environmental conditions (Nwoke, 2008). Alcohol is a teratogen that can produce lifelong birth defects and developmental disabilities. Alcohol easily crosses the placenta and is passed to the developing fetus through the umbilical cord (Ornoy, 2002).

FETAL ALCOHOL SYNDROME (FAS) AND FETAL ALCOHOL SPECTRUM DISORDER (FASD)

The term Fetal Alcohol Syndrome (FAS), a condition associated with prenatal alcohol exposure, was first recognized in the medical literature in the early 1970s (Jones & Smith, 1973). FAS is the most complex condition along the FASD spectrum and is characterized by three diagnostic criteria: three dysmorphic facial features, growth deficits, and central nervous system abnormalities. The facial features that indicate the presence of FAS are (a) short palpebral fissures, (b) a smooth philtrum, and (c) a thin vermillion border (Aase, 1994). The palpebral fissure is the space between the inner and outer corners of the eye that, in the case of FAS, is shorter and may give the eyes a rounder appearance. The philtrum is the vertical groove between the upper lip and the base of the nose. This groove is less prominent in persons affected by FAS.

The third facial feature, the thin vermillion border refers to the border of the upper lip. The second diagnostic criterion is growth deficits. Growth deficits may occur at any point, prenatally or postnatally, and may affect weight, height and/or head circumference (=< 10^{th} percentile adjusted for age and sex). The final diagnostic criterion, central nervous system abnormalities, refers to the structural (e.g., size and shape of corpus callosum, basal ganglia, or cerebellum), functional, (e.g., cognitive, intellectual, or developmental delays) and neurological (e.g., motor problems). Diagnosis by a qualified health care professional requires documentation of all three of the preceding criteria, with or without confirmed fetal exposure to alcohol (Bertrand, Floyd, & Weber, 2005).

Fetal Alcohol Spectrum Disorders (FASDs) is an umbrella term that describes the various conditions that may result from prenatal alcohol exposure. FASD is not a diagnostic term (Williams et al., 2015). FASDs are thought to be at least three times as prevalent as FAS; however, it is also well established that they are under-recognized (Eyal & O'Connor, 2011; Fox et al., 2015; Paley & O'Connor, 2011). It is estimated that as many as 1 in 20 school-aged children may be affected by an FASD, making FASDs more common than autism spectrum disorders (May et al., 2018). FASDs affect a person in various areas across the lifespan, including social development, executive and adaptive function, education, and behavior (Substance Abuse and Mental Health Services Administration, 2014a). In addition to FAS, Alcohol-Related Neurodevelopmental Disorder (ARND) and Alcohol-Related Birth Defects (ARBD) are two types of FASDs which are characterized by distinct signs and symptoms (Astley & Clarren, 2000). ARND may be diagnosed by a qualified healthcare professional when the individual has an intellectual disability; whereas ARBD may be diagnosed when the individual has physical defects (e.g., eye, heart, kidney, ear) associated with prenatal alcohol

exposure and is not otherwise affected by another neurobehavioral disorder (Sampson et al., 1997).

An additional diagnosis that may be considered when children display neurobehavioral symptoms is neurobehavioral disorder associated with prenatal alcohol exposure (ND-PAE). ND-PAE was introduced in the DSM-5 and applies to the vast majority of children with an FASD (American Psychiatric Association, 2013; Hagan et al., 2016)

WOMEN AND SUBSTANCE USE

Overall, global prevalence rates show that women use substances at a much lower rate than their male counterparts. In developed countries, where there is greater gender equality and more fluidity when it comes to gender roles, particularly in the workforce, attention is being paid to the diminishing difference in drinking patterns between men and women (Obot & Room, 2005). A recent study compared data on 12-month alcohol use rates in 2001-2002 to those in 2012-2013. Researchers found increases in alcohol use, high-risk drinking, and rates of alcohol use disorders (AUDs) (Grant et al., 2017). Additionally, although substance use disorders (SUDs) are more prevalent in males, the gender gap in rates of SUDs has narrowed over the past 30 years (Greenfield, Back, Lawson, & Brady, 2010). When examining gender differences, it is important to note that women experience the progression from first use to development of a SUD at a much faster rate and may exhibit more severe symptoms than men even though they may have used for a shorter period of time or used less of the substance (Greenfield et al., 2007; Hernandez-Avila, Rounsaville, & Kranzler, 2004). Women are initiating alcohol use at a much younger age than in the past, and that their drinking patterns and rates of SUDs are becoming more similar to those of men (Keyes, Martins, Blanco, & Hasin, 2010).

In 2014, 15.8 million women reported that they used illicit drugs in the past year and an additional 4.6 million women reported misuse of prescription drugs. Given the high rate of unplanned pregnancies, the use of substances for women of childbearing age poses an additional concern. Substance use during pregnancy has many short- and long-term effects for women and their children. Women of reproductive age who drink and are not using effective and consistent contraception may be at risk for an alcohol-exposed pregnancy (Floyd et al., 2007). If a woman uses substances on a regular basis during pregnancy, her baby may experience withdrawal symptoms at birth, a condition known as neonatal abstinence syndrome (NAS). NAS can occur if a woman uses caffeine, alcohol, opioids, or sedatives (Muhuri & Gfroerer, 2008).

Women of reproductive age who are sexually active with male partners, drink alcohol (particularly heavy use and binge drinking), and do not use effective contraception are at risk for an AEP (Floyd et al., 2007). A key method for identifying whether a woman may be at risk is through the use of alcohol screening (Velasquez et al., 2016). Although research shows that most women stop drinking once they realize they are pregnant, nearly half of all pregnancies are unplanned (Floyd, O'Connor, Sokol, Bertrand, & Cordero, 2005). Therefore, a woman may not change her drinking behavior early in the pregnancy, inadvertently exposing her fetus to alcohol. Recently published data from the Behavioral Risk Factor Surveillance System (BRFSS), describes drinking patterns in both pregnant and non-pregnant women from 2011-2013. Among non-pregnant women, 53.6% reported any use in the past 30 days while nearly 1 in 5 women (18.2%) reported binge drinking. Among pregnant women, one in 10 (10%) reported drinking alcohol in the past 30 days and 3.1% reported binge drinking in the past 30 days (Chartier, Vaeth, & Caetano, 2013).

There are a number of variables that place women at greater risk for having an AEP. For example, women experiencing serious psychological distress, conceptualized as "having any DSM-IV disorder, other than a substance use disorder, for at least 12 months and a Global Assessment of Functioning (GAF) Score of less than 60" (p. 3) were more likely engage in heavier alcohol use than those who did not experience serious psychological distress (Tsai, Floyd, O'Connor, & Velasquez, 2009). Women who have experienced trauma including intimate partner and domestic violence, sexual assault, and child sexual abuse often use alcohol as a coping mechanism (Filipas & Ullman, 2006; Kaysen et al., 2007; Ullman, Filipas, Townsend, & Starzynski, 2005). A particularly vulnerable group of women are those who are engaged in commercial sex work. In the U.S. and worldwide, commercial sex workers use illicit drugs at a much higher rate when compared to women in the general population, placing this group at high risk of HIV infection, sexually transmitted infections, and violence (Shannon et al., 2009; Strathdee et al., 2008; Wechsberg, Luseno, Lam, Parry, & Morojele, 2006).

RACIAL/ETHNIC DIFFERENCES

The consumption of alcohol is relatively common among most ethnic groups in the U.S. In 2013, past-month alcohol use among people age 12 or older was most prevalent among whites (57.7%) followed by persons identifying as more than one race (47.4%), blacks (43.6), Hispanics (43.0%), Native Hawaiians or Other Pacific Islanders (38.4%), American Indians or Alaska Natives (37.3%), and Asians (34.5%) (Substance Abuse and Mental Health Services Administration, 2014b). Binge drinking rates were comparable among Native Hawaiians or Other Pacific Islanders (24.7%), Hispanics (24.1%), whites (24.0%), and American Indians or Alaska Natives (23.5%). Rates were lower for blacks (20.1%) and persons identifying as more than one race (19.6%). The lowest rates of binge drinking were found among Asians (12.4%)

(Substance Abuse and Mental Health Services Administration, 2014b). The rates of heavy alcohol use tend to be higher among Native Americans when compared with other groups (Chartier & Caetano, 2010).

Underserved populations, including some racial and ethnic groups, often experience greater negative health effects from substance use than other groups (Alegria, Carson, Goncalves, & Keefe, 2011; Breslau, Kendler, Su, Gaxiola-Aguilar, & Kessler, 2005). African Americans and Latinos are at a greater risk of developing alcohol-related liver disease than Caucasians and have higher rates of deaths from alcohol-related illnesses, including cirrhosis. This may be, in part, attributable to the drinking patterns of those considered to be heavy drinkers. Among all heavy drinkers, Hispanics and African Americans drink larger quantities of alcohol over a longer period of time than non-Hispanic whites (Carrion, Ghanta, Carrasquillo, & Martin, 2011). Diverse communities often disproportionately experience the weight of substance use disorders due to cultural and socioeconomic factors, including environmental stress, poor access or quality of medical care (Buka, 2002). Once in treatment, studies have shown that African Americans and Latinos are less likely to complete treatment as a result of socioeconomic factors (Cook & Alegria, 2011; Daley, 2005).

In addition to the health effects noted above, women from racial and ethnic minority groups are known to have higher rates of FAS than whites despite lower consumption rates. These differences have been attributed to lower socioeconomic status and healthcare disparities (Caetano, Ramisetty-Mikler, Floyd, & McGrath, 2006; Tenkku, Morris, Salas, & Xaverius, 2009). Tenkku et al. (2009), using surveillance data from the Pregnancy Risk Assessment Monitoring System (PRAMS) found that black, Asian/Pacific Islander, and Hispanic women were all less likely to reduce their heavy drinking after becoming pregnant than were white

women, suggesting that there are within-group differences related to alcohol use. That is to say that women who do drink may do so in a manner that makes it difficult for them to quit once they realize they are pregnant (Tenkku et al., 2009).

THE HISPANIC/LATINO PARADOX

The Hispanic or Latino Paradox is a phenomenon that refers to the longer life expectancy of Hispanics in the U.S. relative to non-Hispanic Whites. Specifically, some epidemiologists have found that Hispanics have similar, if not better, health outcomes despite having lower socioeconomic status (Ruiz, Hamann, Mehl, & O'Connor, 2016). Historically, low socioeconomic status has been associated with higher rates of morbidity and mortality worldwide (Stringhini et al., 2017). This paradoxical finding has been attributed in large part to lower rates of smoking, better health-related behaviors, and better social support among Hispanics, particularly first generation Hispanics (Goldman, 2016). Unfortunately, in recent years, there has been concern about the declining advantage due to higher rates of obesity and diabetes as well as disability among Hispanics compared to non-Hispanic Whites (Goldman, 2016; Hayward, Hummer, Chiu, González-González, & Wong, 2014). It appears that level of acculturation may play a role in that higher levels of acculturation have been linked to poorer health outcomes as described in the section below.

ACCULTURATION

Generally speaking, acculturation refers to the process of being exposed to culturally-based aspects of the dominant society, such as language, customs, and beliefs, and the resulting changes that may occur as a result of these interactions and transactions (Berry, 1997). While there are variations in how acculturation is defined in the literature, including a challenge to the predominant unidimensional framework of low, high, and bicultural, there is agreement that the

degree to which a person identifies with their cultural group and its norms may affect the quality of their migration experiences (Caplan, 2007; Schwartz, Unger, Zamboanga, & Szapocznik, 2010). If level of acculturation is considered along a spectrum, individuals who retain values, norms, and lifestyle of their country of origin would be on the lower end, while individuals who adopt the elements of the dominant culture would be on the higher end (Sabogal, Marín, Otero-Sabogal, Marín, & Perez-Stable, 1987). Historically, biculturalism is a term that has been used to characterize those individuals who can form an identity based on the combination of both cultures and has been associated with better health behavior outcomes (LaFromboise, Coleman, & Gerton, 1993). Conversely, there is strong evidence that suggests that high levels of acculturation may be associated with poorer physical and mental health outcomes (Abraído-Lanza, Chao, & Flórez, 2005). Among Hispanic women, high levels of acculturation have been associated with increased rates of alcohol consumption, smoking, and illicit drug use. Furthermore, in one study, highly acculturated women were 4-7 times more likely to report substance use while pregnant (Hunt, Schneider, & Comer, 2004; Lara, Gamboa, Kahramanian, Morales, & Hayes Bautista, 2005).

These findings shed light on the important role that culture and acculturation plays in health behavior. Despite the concerns, several studies have shown that individuals who are more highly acculturated are also more likely to utilize the health care system and more likely to receive preventive services (Lara et al., 2005).

RISK FACTORS

Women's concurrent use of alcohol and ineffective or no use of contraception places them at risk for an AEP. Although any woman can have an alcohol-exposed pregnancy, there are certain maternal risk factors that are known to be associated with risk of an AEP, including use

of tobacco, maternal drinking patterns during pregnancy, number of pregnancies and viable births, lower education and income level, poor nutritional status, and partner's alcohol use (Jones, Chambers, Hill, Hull, & Riley, 2006; May et al., 2008).The following section will describe the findings from several epidemiological studies conducted both in the U.S. and internationally. Most of these studies use secondary data analysis; however, a few were designed purposely to determine prevalence rates and characteristics associated with AEP risk.

In their analysis of data from the National Survey of Family Growth (NSFG), Cannon and colleagues found that almost 2 million women in the U.S. were at risk for an AEP during any given month from January 2002 to March 2003 (Cannon et al., 2015). Women in this sample met their inclusion criteria of having drank alcohol, had vaginal intercourse with a man, and not using contraception in the past month. This number is inclusive of more than 600,000 women who reported binge drinking, which places them at the highest risk of an AEP. Although they examined a number of demographic and behavioral variables, they only found one close association: intention to get pregnant. A woman's intention to become pregnant was identified by asking whether the woman was not using contraception because of a desire to get pregnant. Among women who answered "Yes" to this question, a significant number continued to drink even after discontinuing contraceptive practices (Cannon et al., 2015). As noted throughout this paper, most women do stop drinking once they are aware of being pregnant (Grant et al., 2009). However, as evidenced by the survey described above, many do not stop or decrease their drinking while trying to get pregnant.

Using data from the National Birth Defects Prevention Study (NBDPS), Ethen et al., examined alcohol use during pregnancy and in the three months prior to pregnancy. Their analysis included 4,088 women who gave birth between October 1997 and December 2002

(Ethen et al., 2009). All women were in the control condition, meaning they had not given birth to a child with a birth defect. Unlike the results obtained by Cannon et al., women in this study were less likely to continue drinking if they intended to get pregnant. However, they also found that by examining past three months' behavior compared to the usual one-month parameter, they were able to determine that alcohol use during pregnancy (before confirmation) was relatively common. These data showed that over 30% of pregnant women had consumed alcohol during pregnancy while 5.7% had engaged in binge drinking. They note that these figures are elevated three-fold when compared to similar data released by the Behavioral Risk Factor Surveillance System (BRFSS) in 2002. Like others, they also found that alcohol use declines once women are aware of being pregnant. A number of behavioral and demographic variables were associated with alcohol consumption or binge drinking during pregnancy, including cigarette smoking, being a non-Hispanic white woman, having an unintended pregnancy and having a higher income. They also found that women who drank before becoming pregnant were more likely to continue drinking after becoming pregnant and that the highest risk for an AEP was among women who were binge drinking prior to pregnancy (Ethen et al., 2009).

Another study, which included a survey of 2,672 women from various settings in three states, found that 333 of them were at risk for an AEP. When compared to survey respondents who were not at risk, the at-risk group were more likely to be older, white, unemployed and have completed less education (Project Choices Research Group, 2002). Recent drug use was the strongest predictor of being at risk for an alcohol-exposed pregnancy. Further analysis of this survey data suggests that low-income women who are polysubstance users are more likely than non-illicit drug users to drink more frequently, engage in binge drinking, not use contraception, have more unintended pregnancies, and drink during pregnancy (Sharpe & Velasquez, 2008).

Other predictors included smoking at least 100 cigarettes in her lifetime, past inpatient treatment for mental health or substance abuse problems, recent physical abuse, and recent history of multiple male sex partners (Project Choices Research Group, 2002).

In another study, a screening instrument, the Prenatal Questionnaire (PNQ) was used to identify risk of alcohol use among pregnant women in a multi-state sample (Montana, Minnesota, South Dakota, and North Dakota) (Leonardson & Loudenburg, 2003). In general, the study found that younger, single, less educated, and unemployed women were at high risk for alcohol use during pregnancy. Other variables associated with risk included past or current physical abuse, past sexual abuse, feeling sad, and being able to hold four or more drinks (Leonardson & Loudenburg, 2003).

A study of 1042 post-partum women in Canada found similar results to those in U.S. samples when examining factors related to pregnancy before and after recognition. Women who identified as Caucasian, had a higher income, and used tobacco were more likely to use alcohol during the period prior to pregnancy recognition (Tough, Tofflemire, Clarke, & Newburn-Cook, 2006). The researchers also found that binge drinking was more common when women were not planning to get pregnant and among women who reported low self-esteem. With respect to drinking following pregnancy recognition, Caucasian women between the ages of 30-39 who use tobacco were more likely than other demographic groups to continue to drink small amounts of alcohol once pregnancy was recognized (Tough et al., 2006).

Given the prevalence of alcohol use during pregnancy, particularly before a woman recognizes that she is pregnant, some research is focusing on the preconception period (Cheng, Schwarz, Douglas, & Horon, 2009; Floyd et al., 2008; Mitchell & Verbiest, 2013). The preconception period is the time during which a woman is planning her pregnancy (Berghella,

Buchanan, Pereira, & Baxter, 2010). As mentioned above, although most women stop drinking once they become aware of their pregnancy, the evidence regarding preconception use of alcohol is mixed. Moreover, with the high rate of unintended pregnancies in the U.S., it is important to examine women's health-related behaviors during the preconception period (Finer & Zolna, 2014).

Using data from the Pregnancy Risk Assessment Monitoring System (PRAMS), Naimi et al, (2003) conducted a case-control study of 72,907 women who provided information about alcohol use and intention to get pregnant. From this sample, 45% reported that their pregnancies were not planned and were more likely to be younger and black compared to women with planned pregnancies. On the whole, 14% of women reported binge drinking during the preconception period. Binge drinking during the preconception period was more likely to occur if a woman was white, unmarried, consuming alcohol, binge drinking prior to pregnancy, and smoking cigarettes (Naimi, Lipscomb, Brewer, & Gilbert, 2003).

In a systematic review of fourteen studies published between 2002 and 2009, including studies from the U.S., Europe, Australia, New Zealand, Japan and Uganda, Skagerstrom and colleagues examined predictors of prenatal alcohol consumption and found that the most predictive variables were drinking prior to pregnancy and abuse or exposure to violence. In these studies, factors such as income, employment and marital status, and level of education were also found to be predictive but less frequently (Skagerström, Chang, & Nilsen, 2011).

Using nationally representative data from the 2002 and 2003 National Survey on Drug Use and Health (NSDUH), Haven's et al., (2009) examined the correlates of substance use during pregnancy. In their study, which included 1,800 pregnant women and 37,527 non-pregnant women, they found that pregnant women were more likely to use alcohol and cigarettes

during pregnancy than any other substances of abuse. Overall, 10% of pregnant women reported alcohol use in the past 30 days (Havens, Simmons, Shannon, & Hansen, 2009). Other significant findings include: lower use in the second and third trimesters as compared to the first trimester; a greater likelihood of current psychopathology in women who used substances during pregnancy; and, significantly less substance use among married and employed women (Havens et al., 2009).

Although the focus of this paper has been on the U.S. population, it is short sighted not to acknowledge the reality that prenatal alcohol exposure is a global health concern. Many studies have been conducted in Europe, other parts of North America, Australia, and Asia (Drabble et al., 2011; Lange, Shield, Rehm, & Popova, 2013). One of the richest sources of prevalence data comes from South Africa and the work of Philip May and colleagues (May et al., 2014). Regrettably, South Africa has the highest rate of FAS in the world. In his study of women in the Western Cape Province, he reported that up to 51% had previously reported drinking during pregnancy (May et al., 2005). Findings from his study reveal significant differences between mothers of children with FAS and the control group. Women in the case group were more likely to have a lower socioeconomic status, have less education, be unmarried, and have fewer ties to spirituality. A large percentage (87%) of women in the case group engaged in heavy binge drinking and did not reduce their consumption during pregnancy. These women tended to come from families in which alcohol abuse was rampant. Measurements of the size, shape, and composition of mothers in the case group demonstrated them to be smaller than the control group, suggesting their own prenatal alcohol exposure (May et al., 2005).

Overall alcohol consumption is greater in European countries than in the U.S. (Rehm, Shield, Rehm, Gmel, & Frick, 2012). Among pregnant women, it is estimated that 23% - 54% of

women in European countries have consumed some alcohol during their pregnancy (Bakhireva et al., 2011). In the U.S., while no less significant to the issue, that figure is estimated to be at least half the rate at 10.2% (Green et al., 2016). In a recent Ukrainian study, 11,909 pregnant women receiving prenatal care were administered a screening instrument that inquired about their use of alcohol. Nearly 93% of the women reported that they had ever consumed alcohol and, of these, 46.3% had consumed alcohol in the past month, and 9.2% had consumed a minimum of 3 drinks on a daily basis (Chambers et al., 2014). The amount of alcohol consumed per day (including heavy drinking) was predicted by a higher score on the TWEAK, being single, unmarried or separated, lower education level, smoking, younger age when first started to drink, having fewer pregnancies (Chambers et al., 2014).

One area that seems to interest researchers, practitioners, and policy makers is the influence of paternal drinking in the incidence of FASD. Although evidence does not support the idea that a male partner's drinking directly affects the developing fetus, his drinking behavior and the quality of the relationship with his partner are associated with maternal drinking during pregnancy (McBride & Johnson, 2016). In an international study of 166 women in the Ukraine, researchers found that males who drank heavily were more likely to have female partners that continued to drink during pregnancy and to drink at risky levels at the time of conception. Poor relationship satisfaction and lack of ability to discuss problems with their partners were significantly correlated with maternal drinking during pregnancy (Bakhireva et al., 2011).

A crucial component of preventing AEPs is identifying women at risk. Unfortunately, several studies have shown that healthcare professionals do not universally or routinely screen for alcohol use in their female patients (Flynn, Marcus, Barry, & Blow, 2003; D. J. Goodman & Wolff, 2013; Rahm et al., 2015). PRAMS data from the state of Maryland was analyzed to

determine alcohol consumption and provider screening rates in a stratified random sample of 12,611 women who gave birth between 2001 and 2008. Women were oversampled on the basis of age (35 and older) and whether they gave birth to a child with low-birth weight. In this sample, 8% of women reported alcohol use in the final three months of pregnancy. Alcohol consumption during this period was more likely to be reported by older, non-Hispanic white, women who graduated from college. Likewise, screening and counseling by healthcare professionals was less prevalent in this group (Cheng, Kettinger, Uduhiri, & Hurt, 2011).

EVIDENCE-BASED PREVENTION

Categories of prevention. The term prevention is critical when discussing FASD, as these conditions are completely avoidable if a woman does not drink alcohol during her pregnancy. However, when considering such complex issues as reproductive health and substance use, prevention efforts must be wide-ranging. Generally speaking, there are three types of prevention: primary prevention, secondary prevention, and tertiary prevention. Primary prevention centers on reducing risks to prevent the onset of the condition. AEP primary prevention involves assessing the possibility of pregnancy, the use of contraception, and current drinking behaviors in women of reproductive age (Floyd, Weber, Denny, & O'Connor, 2009). Secondary prevention focuses on reducing the impact of the condition once it has already occurred. For example, secondary prevention strategies might be utilized once a woman is already pregnant to provide interventions that may assist a woman in stopping her use of alcohol during as early as possible in her pregnancy (Banakar, Kudlur, & George, 2009). Finally, tertiary prevention is used to reduce the long-term impact or recurrence of a condition. Tertiary prevention of AEPs involves screening women with children for prior AEPs and providing appropriate treatment or referral (Caley, Riemer, & Weinstein, 2010). While it is important to

take into account all types of prevention, the focus of this paper will be on primary prevention strategies.

In 1996, the Institute of Medicine (IOM) developed a framework outlining three levels of prevention to decrease the incidence of FASD (Floyd et al., 2009); they are: universal prevention, selective prevention, and indicated prevention. Universal prevention strategies are intended to influence an entire population, without specific attention to individual risk factors. The purpose of universal prevention is to discourage the use of alcohol during pregnancy by providing the general public with information to prevent AEPs. The most common universal prevention strategy is the use of warning labels on alcoholic beverage containers. These labels warn women of the risk of birth defects associated with alcohol consumption and advise them not to drink during pregnancy. Selective prevention strategies target certain subgroups of the population deemed to be at-risk. These strategies are applied regardless of the degree of risk experienced by any one individual in the group. For example, women on college campuses where alcohol use rates tend to be high or in high-risk communities such as American Indian reservations (Cronce & Larimer, 2011; Hanson & Pourier, 2016). Indicated prevention measures focus on individuals who are already engaged in high-risk behaviors. For example, women with substance use disorders (Green, 2007). The focus of the subsequent section is on evidence-based interventions for the prevention of AEPs but will commence with a short discussion on screening.

Screening. The consistent and universal use of validated alcohol screening instruments when providing services to women of reproductive age is an essential first step in reducing the prevalence of AEPs (Caetano et al., 2006). Screening allows for identification of risky drinking and can serve as a springboard for further investigation into AEP risk. There are numerous

validated screening instruments that can be used to screen women of reproductive age. Unfortunately, time constraints do not always permit the administration of lengthier tools. For this reason, many settings use the Single Binge Drinking Question (SBD) based on the NIAAA per day drinking limit. The question asks, "How many times have you had 4 or more drinks [for women] on one occasion?" (Balachova et al., 2015; Centers for Disease Control and Prevention, 2014; Velasquez et al., 2016).

If a woman screens positive based on the SBD, it may be necessary to administer additional screening instruments. The Alcohol Use Disorders Identification Test (AUDIT) is one option. The AUDIT is a 10-item questionnaire used to identify hazardous and harmful drinking patterns and to aid in delivering brief interventions (Saunders, Aasland, Babor, De la Fuente, & Grant, 1993). The AUDIT was developed in the 1980s and early 1990s by the World Health Organization and is publicly available, free, and has been translated to many languages (Saunders et al., 1993). Other commonly used screening tests for alcohol use and misuse include the Michigan Alcohol Screening Test (MAST) and the CAGE (Cut, Annoyed, Guilty, Eye Opener). The TWEAK (Tolerance, Worried, Eye-opener, Amnesia, K/Cut Down) and T-ACE (Tolerance, Annoyance, Cut Down, Eye Opener) are instruments that can be used to screen pregnant women for alcohol use (Smith, Foxcroft, Holloway, Minozzi, & Casazza, 2010).

Finally, though equally as relevant, it may be necessary to screen at-risk women for risk of pregnancy associated with ineffective use of contraception. Ineffective contraception includes using methods that are less reliable (i.e., withdrawal) and not using methods according to documented instructions (i.e., inconsistent taking of birth control pills) (Project Choices Research Group, 2002). The authors of the CHOICES study acknowledge the limitation for in-depth exploration of contraception in certain settings (Velasquez et al., 2016).

EVIDENCE-BASED PREVENTION INTERVENTIONS

Project CHOICES. The Changing High-Risk Alcohol Use and Improving Contraception Effectiveness Study (CHOICES) is an evidence-based intervention that has been shown to decrease the risk of an AEP (Velasquez et al., 2010). The CHOICES intervention was developed through funding from the CDC and was a collaborative effort between the CDC and three universities. Project CHOICES was developed using a step-wise research process that began with a multi-site pilot to identify women at risk for an AEP (Project Choices Research Group, 2002). A subsequent study tested whether a motivational intervention would reduce alcohol consumption and/or increase effective contraception (Project CHOICES Intervention Research Group, 2003). Finally, a randomized controlled trial (RTC) was conducted to test the effectiveness of the intervention in reducing AEP risk (Floyd et al., 2007).

CHOICES targets women at risk for an AEP. AEP risk is conceptualized as engaging in risky drinking, having vaginal intercourse with a fertile male partner, and using no or ineffective contraception (Velasquez et al., 2010). The developers emphasize that the cornerstone of the CHOICES intervention is choice. Women who receive the intervention may choose to change one or both behaviors associated with increased risk of an AEP; that is, they may choose to reduce their consumption of alcoholic beverages to below risky levels, begin using effective contraception, or both (Velasquez et al., 2016). The CHOICES model is based on motivational interviewing (MI) and the TTM. The intervention is comprised of four, 45-60-minute motivational interviewing sessions with a counselor and one contraception session with a health care provider (Velasquez et al., 2010). Participants receiving the CHOICES intervention experienced a two-fold reduction in their odds of being at risk for an AEP when compared to the control group (Floyd et al., 2007). CHOICES is currently being implemented across the country

in a number of diverse communities, including with the Oglala Sioux Tribe in South Dakota (Hanson & Pourier, 2016).

Brief alcohol screening and intervention for college students (BASICS). Brief Alcohol Screening and Intervention for College Students (BASICS) is a preventive intervention for college students, ages 18-24, who drink heavily and have experienced or are at risk for alcohol-related problems (Kulesza, Apperson, Larimer, & Copeland, 2010). It is a harm reduction approach (i.e., a strategy to reduce the negative consequences associated with substance use) (Marlatt & Witkiewitz, 2002). It consists of two brief motivational sessions aimed at assisting students in reducing their alcohol consumption and related consequences, promoting healthier choices, and providing information and coping skills for risk reduction. The sessions are approximately 60-90 minutes in length and are delivered two-to-four weeks apart by a trained BASICS facilitator (Terlecki, Buckner, Larimer, & Copeland, 2011). Excessive consumption of alcohol is widespread on college campuses all over the world. In their meta-analytic review of 18 BASICS studies, Fachini and colleagues found that participation in the BASICS intervention reduced alcohol consumption and associated negative consequences in college students (Fachini, Aliane, Martinez, & Furtado, 2012).

Screening and Brief Intervention (SBI). Alcohol Screening and Brief Intervention (SBI) is an evidence-based prevention intervention commonly used in clinical settings to recognize and assist individuals who may be consuming too much alcohol (Kaner et al., 2009). SBI is not a novel approach but has evolved in many ways since the first brief intervention studies were conducted in 1957, including a shift in paradigm from treatment and tertiary prevention to primary and secondary prevention (McCambridge & Cunningham, 2014). At present time, the focus of SBI is the non-dependent drinker. There have been numerous studies

conducted in emergency departments (D'Onofrio & Degutis, 2002; D'Onofrio et al., 2012), primary care settings (O'Donnell et al., 2014), trauma centers (Zatzick et al., 2014), and across various other health care settings (Chang et al., 2005; Schaus, Sole, McCoy, Mullett, & O'Brien, 2009). SBI entails two key clinical processes: (1) the use of a validated alcohol screening tool to assess an individual's drinking patterns, and (2) a brief intervention delivered to individuals who are drinking at risky or harmful levels. The SBI protocol also includes a mechanism for referring individuals who may be at elevated risk to specialized services (Centers for Disease Control and Prevention, 2014).

SBI has been shown to be effective in reducing risky alcohol use among male and female primary care patients (Ballesteros, Duffy, Querejeta, Ariño, & González-Pinto, 2004; Jonas et al., 2012). However, its efficacy in people who drink heavily or may be dependent has not been demonstrated (Saitz, 2010).

Screening, brief intervention, and referral to treatment (SBIRT). Similar to SBI, Screening, Brief Intervention, and Referral to Treatment (SBIRT), is an evidence-based prevention intervention developed to identify and respond to problematic substance use (Babor et al., 2007). SBIRT targets individuals who are not dependent on alcohol or drugs in the hope of providing intervention before there is a need for specialized treatment. It is a comprehensive, integrated, public health approach. The SBIRT process is three-fold and can be carried out in a variety of settings, including trauma centers, emergency departments, and primary care and community health settings (Bernstein et al., 2007; Levy & Kokotailo, 2011; McCance-Katz & Satterfield, 2012). The process begins with universal *Screening* involving prescreening and additional screening in the event of a positive screen, the delivery of a *Brief Intervention* using motivational interviewing techniques and, when appropriate, *Referral to Treatment*, a similarly

collaborative encounter that assists high-risk individuals in accessing specialty treatment services (Jaeggli & Mitchell, 2007). In addition to screening for alcohol use, SBIRT also screens for drug use and misuse (Babor, Del Boca, & Bray, 2017).

Although SBIRT's effectiveness in male and female populations is well established, few studies have been conducted in women's health settings (Hettema et al., 2015). In a sample of 199 women of reproductive age (18-44), Hettema and colleagues found that 44% of them were drinking at risky levels while 17% were at risk for an AEP. AEP risk was defined by risky drinking and having unprotected sex (Hettema et al., 2015).

SUMMARY

There are several evidence-based interventions that can be used to identify and provide services to women who may be at risk for an AEP. Some of these interventions, including screening and brief intervention and its derivatives (BASICS, SBIRT) are solely focused on alcohol consumption and were not specifically developed for women. The CHOICES intervention uses a bimodal approach that explores drinking and contraception use in women at risk for an AEP. Notwithstanding their differences, both prevention interventions have been shown to reduce risky drinking, a factor that is associated with increased risk of an AEP.

The CHOICES intervention has been tested for its efficacy as a briefer intervention (Ingersoll, Ceperich, Hettema, Farrell-Carnahan, & Penberthy, 2013), as an intervention that can be delivered by phone (Wilton et al., 2013), and with specialized populations (Ingersoll et al., 2005; Letourneau et al., 2017). Most recently, smoking was added as a target behavior in a modified, two-session CHOICES intervention called CHOICES Plus (Velasquez et al., 2017). As aforementioned, cigarette smoking has been highly correlated with alcohol consumption and binge drinking during pregnancy (Ethen et al., 2009; Havens et al., 2009; Naimi et al., 2003).

Furthermore, the negative effects of tobacco on a developing fetus are also well documented (Agrawal et al., 2010). In the CHOICES Plus study researchers found that AEP and tobacco-exposed pregnancy (TEP) risk were both significantly reduced in the CHOICES Plus intervention as compared to the brief advice intervention (Velasquez et al., 2017). A summary of the Project CHOICES and similar interventions, along with recent systematic reviews and meta-analyses of SBI interventions and their findings, is listed in Table 1 below. These studies, due to their methodological rigor, will be analyzed further in the subsequent section.

Table 1

Evidence-Based Prevention Interventions

Reference	Intervention	Study Design	Setting	n	Population	Primary Outcomes	Measures	Significant Findings
Project CHOICES and Similar Interventions								
Floyd et al., 2007	CHOICES	Two-group parallel RCT	Six community-based settings in Florida, Texas, and Virginia	830	Women, age 18-44, at risk for an AEP	Risky drinking, ineffective contraception, risk for AEP	TLFB, AUDIT, BSI, DSM-IV checklist for alcohol disorders, ADBS, Readiness Rulers, ADBC, BSCQ, BSCQ-T, CSE, Temptation for Contraception Scale, Processes of Change	Reduction in risk of AEP, risky drinking, and ineffective contraception use at 9 months
Ingersoll et al., 2005	BALANCE	RCT	Mid-Atlantic urban university	199	Women, age 18-24	Risky drinking, ineffective contraception, risk for AEP	TLFB, FFI, BSI, NEO-PI, OQ-45	Reduced AEP risk at 1-month follow up

Table 1, cont.								
Wilton et al., 2013	Healthy Choices	RCT – telephone vs. in-person	Public health and family practice clinics, college campuses, community event	131	Women, age 18-44	Risk for AEP	TLFB, BAI, EAT-26, Abuse Assessment Screen	Reduced AEP risk in both modalities at 6-month follow up
Ingersoll et al., 2013	EARLY	Three arm RCT	Non-treatment seeking, community sample from two cities and surrounding areas in VA	217	Women, ages 18-44	Drinks per drinking day (DDD), ineffective contraception rate, AEP risk at 3 and 6 months	Core Questionnaire, TLFB, MINI-J, BSI	Reduced AEP risk at 3- and 6-month follow up
Letourneau, et al., 2017	Healthy CHOICES	RCT	Community sample across the state of Florida	89	Hispanic women, ages 18-44	Risky drinking, ineffective contraception as a function of language and acculturation	QDS, TLFB, BAS	Reduced AEP risk, overall; English language and English cultural domain scores were correlated with reduced risk of AEP at 6-month follow up

Table 1, cont.								
Velasquez et al., 2017	CHOICES Plus	RCT	12 primary care clinics in Texas			AEP risk, TEP risk, risk drinking, current smoking, ineffective contraception	TLFB, AUDIT, BSI, Readiness to change, pros and cons for changing, experiential and behavioral processes of change, temptation, confidence	Reduced AEP and TEP at 9-month follow up
Screening and Brief Intervention (SBI) and Similar Interventions								
Kaner et al., 2009	SBI	Systematic Review and Meta-analysis	Primary Care Settings	22 RCTs	All populations	Effects of brief intervention on weekly alcohol consumption amounts		Significant reduction in alcohol consumption at 1 year follow up
O'Donnell et al., 2014	SBI	Systematic Review of Reviews and Meta-analysis	Primary Care Settings	24 systematic reviews	All populations	Effectiveness of brief interventions in primary care		Effectiveness in addressing hazardous and harmful drinking in primary care settings, particularly in middle-aged, male drinkers

Table 1, cont.								
Jonas et al., 2012	SBI	Primary Care Settings	Systematic Review and Meta-analysis	23 RCTs	All populations	Effectiveness of behavioral counseling in improving behavioral outcomes		Behavioral Counseling interventions improve behavioral outcomes for adults with risky drinking
Fachini et al., 2012	BASICS	College campuses	Systematic Review and Meta-analysis	18 RCTs	Men and women with a mean age of 20	Alcohol consumption, alcohol-related problems		Lowered alcohol consumption and lowered negative consequences

Each of the studies included in this literature review ranks highly on the hierarchy of evidence due to the quality of their methodology. Given the multitude of studies that have been conducted in the U.S. and internationally on SBI and its related interventions, the most valuable studies available were recent systematic reviews and meta-analyses. In the past, one of the criticisms associated with meta-analyses was their tendency to analyze very strong studies alongside very weak studies (Rubin & Babbie, 2008). However, in the case of the meta-analyses described within (Fachini et al., 2012; Jonas et al., 2012; Kaner et al., 2009; O'Donnell et al., 2014), only randomized controlled trials (RCTs) were included in the analysis. The studies on Project CHOICES and similar CHOICES interventions were all RCTs (Floyd et al., 2007; Ingersoll et al., 2013; Ingersoll et al., 2005; Letourneau et al., 2017; Wilton et al., 2013). Likewise, all of the FASD treatment interventions were RCTs. RCTs also rank highly in the research hierarchy due to their ability to address sampling bias and threats to internal validity (Rubin & Bellamy, 2012). Although the studies chosen for this critique possess much strength, they also exhibit certain methodological limitations. Overall, the research design and sampling methods were strong in the prevention intervention studies. The following sections provide a critique of the primary methodological challenges and issues as well as strengths of each of the two main groups of studies: CHOICES and similar interventions and SBI and similar interventions.

CRITIQUE OF CHOICES STUDIES

Generally speaking, the CHOICES interventions were well designed and the investigators made deliberate attempts to address possible threats to internal and external validity. The inclusion criteria were well-defined and consistent across the studies in terms of optimizing the rate of the primary outcome. Detailed information regarding participant randomization was not

available for all of the studies. However, the BALANCE study (Ingersoll et al., 2005), the Healthy Choices intervention (Wilton et al., 2013), and the EARLY intervention (Ingersoll et al., 2013) all used blind randomization. The initial participants in Project CHOICES intervention were blinded but blinding was not possible in later stages of the project (Floyd et al., 2007). Sample size was sufficient to assess the effect size in all but two of the CHOICES-like interventions (Letourneau et al., 2017; Wilton et al., 2013). Attrition was noted as a problem in two of the studies Project CHOICES (Floyd et al., 2007) and Healthy Choices (Wilton et al., 2013).

Contamination is a threat to internal validity that can occur in effectiveness studies if the control group is intentionally or accidentally exposed to the intervention (Rhoads, 2011). In the EARLY study, Ingersoll and colleagues acknowledged the possibility of inadvertent contamination due to having the same counselors deliver all of the conditions (Ingersoll et al., 2013).

A common limitation of many of the CHOICES studies was their use of self-report data. In the CHOICES Plus study, however, tobacco use was assessed by both self-report and measurements of cotinine levels. In this study, results of cotinine tests were 85% congruent with participants' self-report (Velasquez et al., 2017). Another limitation was concern that the baseline assessment measured utilized may have produced an intervention effect (Ingersoll et al., 2013; Ingersoll et al., 2005). Social desirability bias was a concern with regard to the follow-up data collected in the BALANCE study (Ingersoll et al., 2005).

CRITIQUE OF SBI INTERVENTIONS

The methodology used in the systematic reviews and meta-analyses of SBI and BASICS was very strong across all four studies. The systematic reviews were conducted via established

methods, including Cochrane Collaboration method (Jonas et al., 2012; Kaner et al., 2009; O'Donnell et al., 2014). Two of the meta-analyses examined the effectiveness of SBI in general primary care populations (Kaner et al., 2009; O'Donnell et al., 2014). However, the other meta-analysis specifically focused on the effect of behavioral counseling on alcohol misuse in adolescent and adult primary care patients (Jonas et al., 2012). The meta-analysis by Kaner and colleagues evaluated outcomes in 22 RCTs which included over 5,800 individuals (Kaner et al., 2009). On the whole, their findings show that SBI was effective in reducing alcohol use at one year follow up when compared to controls. However, analyses of subgroups did not support findings from previous meta-analyses which showed benefits for both males and females (Kaner et al., 2009). While this finding may be attributed to the relatively small number of female subjects included in the meta-analysis, it certainly points to a need for more research, particularly in light of the focus of this paper.

The other SBI study was a systematic review of reviews. The authors based their review on 24 systematic reviews, comprising 56 RCTs. Their findings were similar to previously conducted meta-analyses that demonstrated the effectiveness of SBI in reducing hazardous and harmful drinking in primary care patients with greater significance among middle-aged, males. This review also elucidated several gaps in the evidence related to subgroups, including women, ethnic minority groups, and individuals with severe alcohol use disorders or dual diagnoses (O'Donnell et al., 2014).

The BASICS study assessed the quality of the methodology by analyzing three sources of bias: selection, performance, and attrition (Fachini et al., 2012). The researchers in this study identified a total of 1,452 relevant references, ultimately including 18 RCTs in their systematic review and 12 RCTs in their meta-analysis. The median sample size of the included studies was

212. The researchers found large effect sizes, maintaining the efficacy of BASICS in reducing alcohol consumption and alcohol-related problems when compared to control groups at 12-month follow up (Fachini et al., 2012).

Etiology of Alcohol-Exposed Pregnancies

Women of reproductive age who are drinking alcohol at risky levels and not effectively using contraception may be at-risk for an alcohol-exposed pregnancy (AEP). Risk for an AEP may be associated with maternal demographic and behavioral factors, such as socioeconomic status, race and ethnicity, and experience of trauma. Alcohol is a well-known teratogen and can cause an FASD. FASDs produce lifelong adverse effects, the most involved of them being fetal alcohol syndrome (FAS). The concepts and issues described above provide a broad context for the interplay of variables associated with AEP risk. Prevention of AEPs requires an understanding of health-related behaviors and systemic factors influencing change. The next section explores three theoretical frameworks that have been used in health-sciences research to guide the development of many interventions used to prevent alcohol-exposed pregnancies.

Substance use and whether or not to use contraception are two important health-related behaviors that can have profound effects on women during their reproductive years. Although there are no theories that are specifically associated with AEP, there are numerous theories that have heavily informed the development of interventions to prevent AEP and adverse fetal health outcomes (Floyd et al., 2007; Ingersoll et al., 2013; Ondersma et al., 2015). Applicable theories must seek to explain how behaviors are shaped and modified, the personal attributes necessary for sustained change, and the social and environmental conditions that are needed to support change. The following theoretical frameworks were identified on the basis of their overall relevance, influence on intervention development, and capacity to explain the concepts and

issues associated with AEPs: (1) social learning theory/social cognitive theory, (2) the transtheoretical model, and (3) the social ecological model. At a fundamental level, these theories have more than a few commonalities and each has its unique strengths and weaknesses. The following section will describe these theories, their major assumptions, and how they explain concepts related to AEP.

Social learning theory. Social Learning Theory (SLT) evolved from traditional learning theories, including the works of behavioral theorists John Watson (1913) and B.F. Skinner (1938) who are responsible for the development of classical conditioning and operant conditioning, respectively (Schunk, 2012). Watson, the founder of behaviorism, posited that all human behavior could be explained through the process of classical conditioning. That is, new behavior is learned through a process of association. Watson's theory was a departure from previous schools of thought that focused on unconscious processes, namely Freudian Theory (Watson, 1994). B.F. Skinner was similar to Watson in that he also believed that observable behavior was more valuable to study; however, he also noted that Watson's model oversimplified the complexities of human behavior. He believed that it was equally as important to consider the causes and consequences of action. He referred to this approach as operant conditioning. Operant conditioning uses operants (or responses) to increase or decrease the likelihood of a behavior being repeated (Skinner, 1984). Although both Watson's and Skinner's approaches have contributed vastly to the understanding of behavior, these approaches have also received their share of criticism for lacking generalizability and comprehensiveness (Willis & Giles, 1978).

SLT, developed by Albert Bandura (1977), has been considered to be the link between classical and operant conditioning (Bandura & Walters, 1977). SLT adds two concepts –

mediational processes and observational learning. In 1986, when Bandura published his second book, he expanded upon his original theory and renamed it Social Cognitive Theory (SCT) (Bandura, 1986). In doing so, Bandura's intent was to emphasize the importance of cognition in acquiring and adopting new behavior. In recent years, Bandura's focus has been on applying his theory to promote positive health behaviors (Bandura, 1998, 2004). Generally speaking, SLT suggests that people learn behavior through observing, modeling, and imitating others. The theory considers important concepts not previously explored such as motivation and self-efficacy (Bandura, 1994). His theory describes human behavior as the mutual relationship between cognition, behaviors, and the environment.

In the past two decades, Social Cognitive Theory (SCT) has been associated with a considerable body of evidence on health behaviors and health promotion (Anderson, Winett, & Wojcik, 2007; Strong, Parks, Anderson, Winett, & Davy, 2008; Wallace, Buckworth, Kirby, & Sherman, 2000). The theory has been applied in the development of many interventions to promote positive health behaviors, such as dietary change, cancer screening, contraception, and HIV-risk reduction (Glanz & Bishop, 2010). Self-efficacy and outcome expectancy (i.e., the belief a person holds about the perceived outcomes of a behavior) are two social cognitive concepts that have been associated with alcohol consumption (Burke & Stephens, 1999).

Key constructs of SLT. There are several important concepts associated with social learning theory that help to explain how cognitive, behavioral, and social processes affect change and influence decision making about health-related behaviors. These concepts are defined briefly in Table 2.

Table 2

Key Constructs Associated with Social Learning Theory/Social Cognitive Theory

Construct	**Definition**
Reciprocal determinism	Environmental factors influence individuals and groups, but individuals and groups can also influence their environments and regulate their own behavior
Outcome expectations	Beliefs about the likelihood and value of the consequences of behavioral choices
Self-efficacy	Beliefs about personal ability to perform behaviors that bring desired outcomes
Collective efficacy	Beliefs about the ability of a group to perform concerted actions that bring desired outcomes
Observational learning	Learning to perform new behaviors by exposure to interpersonal or media displays of them, particularly through peer modeling
Incentive motivation	The use and misuse of rewards and punishments to modify behavior
Facilitation	Providing tools, resources, or environmental changes that make new behaviors easy to perform
Self-regulation	Controlling oneself through self-monitoring, goal-setting, feedback, self-reward, self-instruction, and enlistment of social support
Moral disengagement	Ways of thinking about harmful behaviors and the people who are harmed that make infliction of suffering acceptable by disengaging self-regulatory moral standards

From Glanz, K., Rimer, B. K., & Viswanath, K. (Eds.). (2008). *Health behavior and health education: theory, research, and practice*. John Wiley & Sons.

Major assumptions of SLT

Observational Learning. Observational learning is learning that occurs as a result of observing others' behaviors. However, observational learning goes beyond merely watching other people act and replicating it. The person who is observing the behavior must not only watch it, but they must also encode it into memory, have the capacity to replicate it, and possess the motivation to carry out the behavior (Merriam, Caffarella, & Baumgartner, 2007).

Observational learning can assist people in developing new behaviors, or modify their occurrence. In other words, previously learned behavior can either be increased or decreased. Observational learning is particularly important during childhood when persons of authority, such as caregivers, are most influential. In his famous Bobo-doll experiment, Bandura, demonstrated how children's behavior was influenced by the manner in which authority figures were rewarded, punished, or received no consequence based on their behavior toward the inflatable toy. Bandura concluded that behavior was not solely influenced by considering the direct consequences but, instead the associated implications of the action (Bandura & Walters, 1977).

*Imitation and modeling***.** The process of imitation in SLT is referred to as modeling. Modeling occurs when a role model displays a certain behavior to an observer. The role model is the person whose behavior will be imitated. According to Bandura, the role model has a significant part to play in whether a behavior is repeated or not. For example, if the role model's behavior is rewarded, the person who is observing is more likely to repeat the behavior (Bandura & Walters, 1977). Furthermore, the relationship of the role model to the observer is also an influential factor. If the role model is respected or liked, the observer is more likely to imitate the behavior. Bandura's concept of modeling was criticized by many as simply mimicry (Bandura, 2005).

Learning without change in behavior. Bandura noted an important distinction between learning and behaviors: individuals can learn how to do something but choose not to do it (Bandura, 2005).

Cognitive processes. As aforementioned, Bandura's theory recognizes the importance of cognitive processes in learning new behaviors (Bandura, 2005). Bandura's work has evolved

since he first developed SLT in the late 1970's. Today, the theory is more comprehensive, as it considers not only learning and behavior but also individual beliefs (self-efficacy) and environmental conditions (Bandura, 2004). Self-efficacy is the belief that an individual has regarding their ability to carry out behaviors that lead to accomplishment of some task or goal (Schwarzer & Luszczynska, 2007).

Social-Ecological Model. Social Ecological Models (SEM) assert that there are multiple levels of influence (such as individual, interpersonal, organizational, community, and public policy) that form behaviors and that these behaviors are influenced by the social environment (McLeroy, Bibeau, Steckler, & Glanz, 1988). The tenets of SEM are similar to those of SLT described above, as they suggest that the quality of environments is a critical factor in the adoption of healthy behaviors (Golden & Earp, 2012). SEM is considered a variation of Urie Brofenbrenner's Ecological Systems Theory and was developed specifically to understand how intrapersonal community and institutional factors, as well as interpersonal processes and public policy affect health-related behavior change. Developed by McLeroy and colleagues (1988), this model's core strength is its contribution to the understanding of how socio-political environments affect individual change processes (Golden and Earp, 2012). The SEM theory continues to be refined, including recent efforts to develop an inside out framework that departs from the earlier systems' theories by suggesting that policy and environment should be placed in the center as a means of understanding how individuals and established groups can drive policy and environmental change (Golden et al., 2015).

The epidemiological evidence discussed above clearly points to existing disparities in the field of AEP prevention and FASD. The SEM was chosen due to its strength in explaining how systems influence the health of individuals (McLeroy et al., 1988). In his early work, McElroy

noted the tendency of public and private sectors to address health promotion through interventions designed to change individual behaviors (McLeroy et al., 1988). He described many concerns about the oversimplified nature of the life-style hypothesis and encouraged the development of interventions using a multifactorial framework, recognizing their role in affecting health behaviors (McLeroy et al., 1988). Unfortunately, most interventions continue to focus on the individual or intrapersonal realm rather than the larger social systems (Golden & Earp, 2012).

Key constructs of SEM. The social ecological model (SEM) places great emphasis on the relationships that exists between multi-systemic factors and the individual. The concepts associated with SEM are described in Table 3.

Table 3

Key Concepts Associated the Social Ecological Model

Construct	Definition
Intrapersonal factors	Characteristics of the individual such as knowledge, attitudes, behavior, self-concept, skills, etc. This includes the developmental history of the individual
Interpersonal processes and primary groups	Formal and informal social network and social support systems, including the family, work group, and friendship networks.
Institutional factors	Social institutions with organizational characteristics, and formal (and informal) rules and regulations for operation.
Community factors	Relationships among organizations, institutions, and informal networks within defined boundaries.
Public policy	Local, state, and national laws and policies.

From McLeroy, K. R., Bibeau, D., Steckler, A., & Glanz, K. (1988). An ecological perspective on health promotion programs. *Health Education & Behavior, 15*(4), 351-377.

Major assumptions of SEM. According to McLeroy and colleagues, the SEM framework is guided by the following three assumptions (McLeroy et al., 1988):

Interpersonal, organizational, community, and public policy factors support and maintain unhealthy behaviors, (2) Appropriate changes in the social environment will produce changes in individuals, (3) Support of individuals in the population is essential for implementing environmental changes. (p. 351)

Transtheoretical Model. As the name suggests, the Transtheoretical Model (TTM) of behavior change is an approach that emerged from the analysis and integration of various psychological theories. It is an integrative, biopsychosocial model that conceptualizes the process of intentional behavior change (Prochaska & Velicer, 1997). In other words, rather than assuming that all change occurs as a result of imposition from either behavioral or social influences, TTM asserts the importance of the self in making decisions (Prochaska & DiClemente, 2005). The model has been applied to a number of problem behaviors, including smoking cessation, weight management, and drug and alcohol abuse, to name a few (Blume, Schmaling, & Marlatt, 2006; Nidecker, DiClemente, Bennett, & Bellack, 2008; Prochaska et al., 2005). A number of interventions based on the model have been developed and evaluated in many randomized controlled trials (RCTs), including the prevention interventions described earlier in this paper (Bray et al., 2014; Johnson, Velasquez, & von Sternberg, 2015). Despite its successes, the model has also faced its share of criticisms, including questioning the validity of the stages, the simplification of decision-making variable, and that the model is not predictive (Prochaska, 2006; West, 2005). The developers of the theory have presented cogent responses to these criticisms while also noting the practical advancements in the model over the past decade (Prochaska, 2006).

Key constructs of TTM. The primary construct of the TTM is the Stages of Change, which describes how change occurs over time. Other key constructs are: The Processes of

Change, decisional balance, self-efficacy, and temptation. These constructs will be described further below.

Stages of Change. This construct describes the process by which individuals move through a series of phases or steps to make (or not make) a behavior change (Prochaska & DiClemente, 1992). Stages of Change is a cyclical process in which individuals progress in order of the stage but may relapse and recycle through the stages several times. It is also possible that they may never reach the last stage. There are five Stages of Change: Precontemplation, Contemplation, Preparation, Action, and Maintenance. People who are in the Precontemplation stage are not yet ready to make a change and may be unaware that a change is needed. They do not intend to take action in the foreseeable future. Contemplation is the stage in which people are thinking about a change. People in this stage are more aware of reasons for making a change but are also considering reasons for maintaining the behavior. As the individual begins to weigh the pros and cons, ambivalence may develop and make it difficult to move beyond this stage. Preparation is the stage in which people are committed to making change in the immediate future. In most cases, these individuals have already taken some action and have a specific plan of action in place, such as joining a gym, talking to a therapist, or talking to their physician. Action is the stage in which individuals are actively engaged in behavior change. Maintenance is the stage in which individuals have made apparent modifications in their behavior and are working to prevent relapse (Prochaska & DiClemente, 1992). Two related concepts are relapse/recycling and termination. Relapse/recycling refers to a return to an earlier stage once in Action or Maintenance. Although not a formal stage in the original TTM, termination may occur when an individual is no longer tempted to engage in the undesired behavior (Prochaska & DiClemente, 2005).

Processes of change. The Processes of Change are the overt and covert activities that people employ to progress through the Stages of Change and are particularly important in intervention development, as they are the independent variables required to move from one stage to the next (Prochaska & DiClemente, 1986). The 10 Processes of Change are divided into two groups, cognitive-affective (experiential) and behavioral. Table 4 provides a description of each of the Processes of Change.

Table 4

Processes of Change in the Transtheoretical Model

Cognitive-affective (experiential processes)	
Consciousness-raising	Finding and learning new facts, ideas, and tips that support the healthy behavior change
Dramatic relief	Experiencing the negative emotions (fear, anxiety, worry) that go along with unhealthy behavioral risks
Self-evaluation	Realizing that the behavior change is an important part of one's identity as a person
Environmental evaluation	Realizing the negative impact of the unhealthy behavior or the positive impact of the healthy behavior on one's proximal social and/or physical environment
Social liberation	Realizing that the social norms are changing in the direction of supporting the healthy behavior change
Behavioral processes	
Counterconditioning	Substitution of healthier alternative behaviors and cognitions for the unhealthy behavior
Stimulus control	Removing reminders or cues to engage in the unhealthy behavior and adding cues or reminders to engage in the healthy behaviors
Reinforcement management	Increasing the rewards for the positive behavior change and decreasing the rewards for the unhealthy behavior
Helping relationships	Seeking and using social support for the healthy behavior change
Self-liberation	Making a firm commitment to change

From Tucker, J. A., Donovan, D. M., & Marlatt, G. A. (Eds.). (2001). *Changing addictive behavior: Bridging clinical and public health strategies*. Guilford Press.

Decisional Balance. Decisional balance refers to the process of weighing the pros (benefits) and cons (costs) of changing a behavior. Prochaska and DiClemente adapted and simplified this construct from the work of Janis and Mann (Velicer, DiClemente, Prochaska, & Brandenburg, 1985). Along with Stages of Change, decisional balance can be used to understand the role of motivation in health behavior change (Share, McCrady, & Epstein, 2004).

Self-Efficacy and Temptation. Self-efficacy is the degree of confidence individuals have in maintaining their desired behavior change in situations that often trigger relapse. Temptation is the intensity of urges to engage in a specific behavior when in difficult or challenging situations (Prochaska & DiClemente, 1986). The self-efficacy construct was adapted from Bandura's Social Learning Theory described previously (Bandura & Walters, 1977).

Major assumptions of TTM. There are four major assumptions of the transtheoretical model: (1) there is not one theory that can alone explain the difficulties associated with behavior change, (2) behavior change occurs over time through a series of stages, (3) action-oriented interventions may not be best suited for serving persons at risk who are unlikely to be prepared for action, and (4) specific processes of change have been associated with specific stages and should be utilized in accordance to make the most of an intervention (Shumaker, Ockene, & Riekert, 2008).

THEORETICAL RELEVANCE TO AEP

Drinking is a social norm in many cultures. Milestones such as a person's 21st birthday (i.e., the legal age of consumption in the U.S.), wedding, birth of a child, and even death are often celebrated, in part, by drinking alcohol. People drink for numerous reasons, including to reduce inhibitions, stress, and anxiety (Halim, Hasking, & Allen, 2012). At times, drinking patterns, particularly risky drinking can pose problems for the individual and those around them.

Risky alcohol use can lead to many short- and long-term negative health, social, and legal consequences (Sacks, Gonzales, Bouchery, Tomedi, & Brewer, 2015). Any drinking during pregnancy poses risks for the developing fetus (Centers for Disease Control and Prevention, 2014). In order to consider the most appropriate ways to intervene when alcohol use rises to the level of harmful or hazardous, it is necessary to consider the most relevant individual and systemic elements that affect behavior change. The major assumptions and related concepts of the theories described above help to explain the multifactorial influences that drive health behavior and health behavior change.

Social Cognitive Theory (SCT) has been used to inform the development of interventions to reduce harmful alcohol use, particularly through exploring self-efficacy and outcome expectancies (Gilles, Turk, & Fresco, 2006; Halim et al., 2012). Self-efficacy is also an important construct in the TTM, as it is instrumental to long-term change and can be harnessed to assist clients in developing skills to overcome temptation (Schwarzer & Luszczynska, 2007). Interventions, particularly those involving educational components such as brief intervention, have been developed from learning theories (Stade et al., 2009). Although SCT recognizes the role of the environment in influencing behaviors, the theory places great emphasis on intrapersonal factors. In order to fully understand the complexities of human behavior and behavior change, it is necessary to consider the interplay of social, environmental, and political factors and how they may serve as barriers to healthy behavior.

The Social Ecological Model (SEM), which has been applied to a number of public health prevention efforts, allows for a thorough examination of factors beyond the intrapersonal, including community and political influences (Golden & Earp, 2012). Research has previously examined the placement of liquor stores in poor communities (Bluthenthal et al., 2008; Campbell

et al., 2009). Alcohol marketing and lobbying are big business and without effective counter-messages, women of childbearing age and their partners may not be aware of the risks. The SEM framework provides a deeper understanding of how social constructs directly and indirectly affect decision making. Recent research on the model has proposed increased participation by individuals in the development of policies to promote healthier environments (Golden, McLeroy, Green, Earp, & Lieberman, 2015). In the case of a woman who might be struggling with an alcohol use disorder (AUD), SEM might encourage researchers, providers, and policy makers to consider the effects of punitive legislation, barriers to access to treatment, and the extent to which a woman's community can help or hinder her ability to make changes.

Chapter 3: Methodology

This study was designed to explore the role of acculturation in decision making regarding alcohol and contraception use among Hispanic women. Data from the parent study, a two-group randomized clinical trial (PI: Velasquez), conducted in 12 primary care clinics were analyzed. Recruitment for the original study took place through interviews conducted face-to face in the health center or by telephone interviews that occurred in response to recruitment flyers posted in the waiting rooms of the clinics. A full description of the methods for the parent study have been reported elsewhere (Velasquez et al., 2017). For the purposes of the current study, participant data from the intervention and control (Brief Advice) conditions were collapsed into a single data set.

STUDY SAMPLE

The study sample consisted of 261 women who met eligibility criteria defined as 1) being between the ages of 18-44; 2) not sterile; 3) not pregnant or planning to become pregnant in the next 9 months; 4) had vaginal intercourse with a man with no known fertility problems during the previous 3 months without using effective contraception; and 5) drank at risk levels (>3 drinks per day or >7 drinks per week, on average) in the previous 3 months. Participants were randomized into one of two study conditions: CHOICES Plus or Brief Advice. Both interventions were provided by Behavioral Health Specialists (BHS), Master's prepared clinicians with previous proficiency in Motivational Interviewing (MI).

Participants in the CHOICES Plus condition received the manualized intervention which consisted of two 40-minute sessions aimed at identifying one or more target behaviors to change, providing tailored feedback about risk for AEP and TEP, decreasing temptation to engage in risk behavior and increasing confidence to prevent it, assisting in the development of goals and plans

for change, and promoting a contraception session. The contraception session was conducted separately by either a family physician or nurse practitioner. Participants receiving the Brief Advice intervention were provided with brief advice about alcohol and tobacco use, written psychoeducational materials on diet, exercise, and illicit drug use, and referral information for community and clinic system-specific services.

MEASUREMENT

Participants in both study conditions completed a baseline, 3, 6, and 9-month questionnaire which included demographic information and questions on health history and status, sexual activity and use of birth control, smoking, alcohol and illicit drug use. The 6-month interview was conducted by phone and is not included in the data analysis for the current study. The Brief Symptom Inventory (BSI) was also administered and TTM constructs (experiential and behavioral processes of change, decisional balance, temptation, and confidence) were assessed for alcohol, smoking, and contraception use. The Timeline Followback (TLFB) method was used to assess alcohol and contraception outcomes by estimating daily alcohol use, vaginal intercourse, and contraception use. The Marin Short Acculturation Scale for Hispanics (SASH) was administered at baseline to assess level of acculturation.

Variables

Timeline Followback

The Timeline Followback (TLFB) was used to assess alcohol and contraception outcomes by estimating daily alcohol use (measured as drinks per week), vaginal intercourse, and contraception during the period between 90 days prior to enrollment and 9-months post-enrollment (measured as ratio of days of protected days over days of vaginal intercourse). The method has been shown to be reliable when administered in-person or by phone or computer

(Maisto, Conigliaro, Gordon, McGinnis, & Justice, 2008; Rueger, Trela, Palmeri, & King, 2012; Sobell, Brown, Leo, & Sobell, 1996). It has also been shown to be reliable and valid with various cultural groups including Spanish-speaking individuals with alcohol use disorders (AUDs) (Sobell et al., 2001). The TLFB has good psychometric properties, including, high test-retest reliability (Cohen & Vinson, 1995) and is useful in providing information about amount of alcohol consumed, patterns of consumption, and differences over time. It has also been shown to be a useful tool in promoting motivation to change (Cox, Pothos, & Hosier, 2007). The method uses a calendar or diary to assist individuals in recalling their drinking over a given number of days. Additionally, it provides information about what constitutes a standard drink, types of alcoholic beverages and also probes for information about times when the person remains abstinent (Sobell & Sobell, 1996). Similarly, the TLFB has been shown to be a valid and reliable measure for sexual behavior (Weinhardt et al., 1998).

Transtheoretical Model (TTM) Constructs

A readiness ruler is a type of visual analog scale (VAS) used to assess change-related concepts, including a person's readiness to change a specific behavior, the importance of making the change, and their confidence in making the change. These scales have been used extensively in research on risky drinking and smoking and are considered to possess strong validity and reliability (Bertholet, Gaume, Faouzi, Gmel, & Daeppen, 2012; Boudreaux et al., 2012). Most scales range from 0 or 1 – 10, where 0 or 1 indicate not being ready at all and 10 indicating being very ready to change. In the parent CHOICES Plus study, readiness rulers were used to assess importance, readiness to change, and confidence in changing related to the primary outcomes of

contraception use and alcohol use. For example, women were asked, "On the following scale, make a slash mark at the place that best reflects how ready you are at the present time to use effective birth control every time you have sex." The current study examines temptation relative to confidence in making a change regarding alcohol, tobacco, and contraception use.

Decisional balance (pros and cons for change)

The decisional balance exercise was used to assess the costs and benefits (i.e., pros and cons) of making a change related to alcohol, tobacco, and contraception use. Participants were asked to list reasons for maintaining behavior related to drinking, smoking, and contraception use as well as reasons against maintaining the behavior. For example, the behavioral health specialist would ask, "For each exercise, I'd like you to list the good things and the less good things with regard to your alcohol use, your use of birth control, and cigarette use (if applicable)."

Experiential and behavioral processes of change

Experiential and behavioral processes of change elements that are implemented to demonstrate how behavior change occurs. Participants were provided with a series of statements describing situations or thoughts they may presently use to help them not drink alcohol, use tobacco, or use contraception. Respondents were asked to respond how often they made use of the situation or thought in order to help them not drink, not use tobacco, or use contraception. The response categories were: never, seldom, occasionally, frequently, repeatedly. Examples of experiential processes of change for alcohol, included: "I stop to think about how my drinking is hurting people around me," I think about information that people have personally given me on the benefits of quitting drinking," and "I think about the type of person I will be if I control my drinking." Examples of behavioral processes of change, include: "I can talk with at least one

special person about my drinking experiences," I remove things from my home or work that remind me of drinking," and "I avoid situations that encourage me to drink." Similar, relevant situations and thoughts were presented for tobacco and contraception use.

Confidence and Temptation

Participants were provided with a series of situations in which people may be lead to drink alcohol or smoke. They were asked the following question, "How confident are you that you would not drink alcohol (smoke) in the following situation?" For each of the situations, they were provided with the following response categories: not at all confident, not very confident, moderately confident, very confident, and extremely confident. Some examples of the situations for drinking included, when the person felt depressed, when they had trouble sleeping, and if they had an argument with a friend. Immediately following the confidence questions, participants were provided with the same list of situations and asked, "How tempted would you be to drink alcohol (smoke) in the following situation?" Response categories were: not at all tempted, not very tempted, moderately tempted, very tempted, extremely tempted. Some examples for smoking were: with friends at a party, when the person first got up in the morning, when they were very anxious and stressed, and with their spouse or close friend who is smoking.

Confidence and temptation rulers were also utilized to assess how confident the women were in using birth control in a series of situations and how tempted they were to have sex without the use of birth control. The women were asked, 'How confident are you that you would use birth control in the following situation?" For each of the situations (e.g., if using alcohol or drugs, if partner gets upset or angry, if birth control is too much trouble), the response categories were: not at all confident, not very confident, moderately confident, very confident, and

extremely confident. Following this series of questions, participants were asked, “How tempted would you be to have sex without the use of birth control in the following situation?”

The SASH is a brief instrument developed to identify Hispanics on the basis of low or high levels of acculturation. The SASH consists of 12 questions that assess level of acculturation across three domains: language use, media, and ethnic social relations (Marin et al., 1987). The language use subscale has five questions with five response categories where 1 = Only Spanish, 2 = Spanish better than English, 3 = Both Equally, 4 = English better than Spanish, and 5 = Only English. The media domain consists of 3 questions with response categories 1 = Only Spanish, 2 = More Spanish than English, 3 = Both Equally, 4 = More English than Spanish, and 5 = Only English. The final 4 questions relate to the ethnic social relations domain and contain the following response categories: 1 = All Spanish/Hispanics, 2 = More Hispanics than Non-Hispanics, 3 = About Half & Half, 4 = More Non-Hispanics than Hispanics, and 5 = All Non-Hispanics. The SASH is included in Table 5.

Table 5

The Short Acculturation Scale for Hispanics (SASH)

	Only Spanish	Spanish better than English	Both Equally	English better than Spanish	Only English
In general, what language(s) do you read and speak?	1	2	3	4	5
What was the language(s) you used as a child?	1	2	3	4	5
What language(s) do you usually speak at home?	1	2	3	4	5
In which language(s) do you usually think?	1	2	3	4	5
What language(s) do you usually speak with your friends?	1	2	3	4	5
In what language(s) are the T.V. programs you usually watch?	1	2	3	4	5
In what language(s) are the radio programs you usually listen to?	1	2	3	4	5
In general, in what language(s) are the movies, T.V. and radio programs you prefer to watch and listen to?	1	2	3	4	5
	All Spanish/Hispanics	More Hispanics than Non-Hispanics	About Half & Half	More Non-Hispanics than Hispanics	All Non-Hispanics
Your close friends are:	1	2	3	4	5
You prefer going to social gatherings/parties at which the people are:	1	2	3	4	5
The persons you visit or who visit you are:	1	2	3	4	5
If you could choose your children's friends, you would want them to be:	1	2	3	4	5

The Brief Symptom Inventory 18 (BSI 18) was used to evaluate current (last 7 days) psychological distress (Derogatis & Melisaratos, 1983). The BSI 18 is a shortened version of the Symptom Checklist-90-Revised (SCL-90-R) which is commonly used in clinical and community settings (Derogatis & Unger, 2010). The BSI 18 uses a 5-point Likert scale (not at all, a little bit, moderately, quite a bit, extremely) to assess the severity of symptoms. The BSI 18 has three six item subscales (somatization, depression, and anxiety) as well as the overall global severity index. The BSI subscales for somatization, depression, and anxiety are summarized by category and item number in Table 6. The global severity index was not included in the current study.

Table 6

Somatization, depression, and anxiety subscales for the Brief Symptom Inventory 18 (BSI 18)

Item Number	Scale 1: Somatization
1	Faintness or dizziness
4	Pains in heart or chest
7	Nausea or upset stomach
10	Trouble getting your breath
13	Numbness or tingling in parts of your body
16	Feeling weak in parts of your body
Item Number	Scale 2: Depression
2	Feeling no interest in things
5	Feeling lonely
8	Feeling blue
11	Feelings of worthlessness
14	Feeling hopeless about the future
17	Thoughts of ending your life
Item Number	Scale 2: Anxiety
3	Nervousness or shakiness inside
6	Feeling tense or keyed up
Table 6, cont.	
9	Suddenly scared for no reason
12	Spells of terror or panic
15	Feeling so restless you couldn't sit still
18	Feeling fearful

DATA ANALYSIS

The variables chosen for analyses were individual risk behaviors (e.g., risk drinking, current smoking, and ineffective contraception), items from the SASH, and TTM constructs (experiential and behavioral processes of change, decisional balance, temptation and confidence scales). Descriptive statistics (frequencies, means, and percentages), independent t-tests, and Chi

Square tests were calculated using the Statistical Package for the Social Sciences (SPSS) version 24. A repeated measures ANOVA was conducted to explore the relationship between ethnicity (Hispanic and non-Hispanic) and alcohol and contraceptive use across three time points. An interaction effect, main effect, and time effect were calculated for the alcohol and contraception variables. A repeated measures ANOVA was conducted to explore the relationship between ethnicity (Hispanic and non-Hispanic) and baseline scores on the depression, anxiety, and somatization subscales of the BSI. A series of repeated measures ANOVAs were also conducted to explore the relationship between acculturation and the TTM experiential and behavioral processes of change, decisional balance (pros and cons for change), and confidence and temptation. An interaction effect, main effect, and time effect were calculated for the TTM variables across three time points.

The repeated measures ANOVA was chosen due to its ability to test differences between the scores of the dependent variable over three time points. Tests of within-subjects effects were performed in SPSS. When conducting a repeated measures ANOVA, it is important to test the assumption of sphericity. Sphericity occurs when variances of the differences of all combinations of the related levels are equal (i.e., there will be a positive correlation between scores for the same group of people over three or more time points) (Oberfeld & Franke, 2013). If sphericity is violated, the F-ratio is inflated, increasing the risk of a Type I error. In SPSS, Mauchly's Test of Sphericity can be used to test sphericity. When α ($\geq .05$), we fail to reject the null hypothesis, meaning that the assumption of sphericity has not been violated. If the probability of the Mauchly's statistic is less than α, we have violated sphericity. Greenhouse-Geisser is a correction to the degrees of freedom in order to produce a more valid F-ratio.

The SASH is scored by averaging the responses of all 12 items. An average score between 1 and 2.99 is used to categorize the respondent as less acculturated whereas an average score above 2.99 is considered to be indicative of being more acculturated (Marin et al., 1987). In order to complete the analyses, it was necessary to transform the variable from continuous to categorical. The new variable used in the analyses, contained three categories representing low, middle, and high levels of acculturation, Marin category 1, Marin category 2, and Marin category 3, respectively. Marin category 1 represented mean scores less than 2.5, Marin category 2 represented mean scores between 2.5 and 3.5, and Marin category 3 represented scores greater than 3.5.

Chapter 4: Results

In Chapter 4, the characteristics of the study sample are described, including demographics, level of acculturation, smoking status, and baseline drinking. Next, baseline BSI subscale scores for depression, anxiety, and somatization were compared for Hispanic and non-Hispanic participants. Lastly, the TTM constructs of experiential and behavioral processes of change, decisional balance (pros and cons for change), and temptation and confidence were compared according to level of acculturation, defined by three categories of the SASH, across three time points. The results are presented below according to the corresponding specific aim and research question.

Specific Aim 1: Describe the study sample

Aim 1, research question 1:

- How does the study sample of Hispanic women differ from the non-Hispanic women in terms of demographics, level of acculturation, smoking status, and baseline drinking?

The purpose of Aim 1 was to provide a descriptive analysis of the study sample in terms of characteristics, including age, marital status, employment status, household income, education, and level of acculturation. Data regarding smoking status (yes or no) and baseline alcohol use are also provided. Descriptive statistics, including frequencies and percentages, means, independent t-tests, and Chi-Square tests were performed to identify whether demographic variables differed by Hispanic versus non-Hispanic ethnicity.

Sample characteristics

The sample consisted of 261 women, between the ages of 18 and 44. Frequencies and percentages for the total sample, Hispanic women, and non-Hispanic women can be found in Table 7. Women in the sample had a mean age of 31.11 years. Nearly half of the sample

identified as Hispanic (47.1%) compared to 52.9% that identified as non-Hispanic. Over 85% of the Hispanic participants reported that they were Mexican or Mexican American. Participants who did not identify as Hispanic were more likely to be non-Hispanic Black (41.8%). The majority of the sample reported a household income of less than $30,000 per year (88.6%), 59.4 % (n = 155) reported being single (never married), separated, or divorced. Most women in the sample reported that they were not currently working (62.1%). Hispanic women were more likely to be married or living with a partner (57.7% versus 25.4% of those who identified as non-Hispanic), Non-Hispanic women were more likely to be highly acculturated (100% compared to 28.6% of Hispanic women). Hispanic women were less likely to be current smokers (33.3%) than non-Hispanic women (55.8%).

Hispanic women were found to be younger on average (28.9 years) compared to non-Hispanic women (33.1 years). The independent samples *t*-test was associated with a statistically significant effect, $t(259) = 5.01$, $p < .001$. There were variations in marital status across the two groups. Non-Hispanic women were more likely to be single or never married (56.6%) than Hispanic women (29.3%) whereas Hispanic women were more likely to be living together, but not married (26.8%) than non-Hispanic women (13.8%). A chi-square test of independence revealed significant differences in marital status based on Hispanic versus non-Hispanic ethnicity, $\chi^2 (4, N = 261) = 30.50$, $p < .001$. Non-Hispanic women were found to have completed more years of school on average (12.26) than Hispanic women (10.92). The independent samples *t*-test was associated with a statistically significant effect, $t(259) = 3.82$, $p < .001$.

There were no significant differences in household income between Hispanic and non-Hispanic women in the sample. Although the percentage of Hispanic and non-Hispanic women who were working was similar, Hispanic women were more likely to be full-time homemakers

(18.7%) than non-Hispanic women (5.1%) and non-Hispanic women were more likely to be unable to work due to disability (7.2%) compared to Hispanic women (1.6%). A chi-square test of independence revealed significant differences in employment based on Hispanic versus non-Hispanic ethnicity, χ^2 (8, N = 261) = 18.12, p = .020. There was also a significant difference between levels of acculturation, χ^2 (2, N = 144.141, p <.001. Non-Hispanic women were more likely to report high levels of acculturation (100%) compared to Hispanic women (28.6%).

To test the hypothesis that Hispanic women will report drinking fewer drinks per week at baseline than non-Hispanic women, an independent samples *t*-test was performed. The independent samples *t*-test was associated with a statistically significant effect, $t(224) = 2.90$, p = .004. Therefore, Hispanic women were associated with a significantly lower mean number of drinks per week than non-Hispanic women.

Table 7

Characteristics of the study sample by Hispanic ethnicity

Variables	Total sample n (%)	Hispanic n (%)	Non-Hispanic n (%)	*p* value
Participants	261	123 (47.1)	138 (52.9)	
Age (years) Mean (SD)	31.11 (7.1)	28.85 (6.8)	33.13 (6.9)	<.001
Marital status				<.001
Single, never married	114 (43.7)	36 (29.3)	78 (56.5)	
Legally married	54 (20.7)	38 (30.9)	16 (11.6)	
Separated	24 (9.2)	11 (8.9)	13 (9.4)	
Divorced	17 (6.5)	5 (4.1)	12 (8.7)	
Living together but not married	52 (19.9)	33 (26.8)	19 (13.8)	
Education (years) Mean (SD)	11.63 (2.9)	10.92 (3.2)	12.26 (2.5)	< .001
Income				.594
Less than $10,000	116 (44.4)	51 (42.1)	65 (48.5)	
$10,000 to $19,999	65 (24.9)	30 (24.8)	35 (26.1)	
$20,000 to $29,999	45 (17.2)	25 (20.7)	20 (14.9)	
$30,000 to $39,999	19 (7.3)	10 (8.3)	9 (6.7)	
$40,000 to $49,999	6 (2.3)	4 (3.3)	2 (1.5)	
$50,000 or more	4 (1.5)	1 (0.8)	3 (2.2)	

Table 7, cont.				
Employment				.020
Working	98 (37.5)	46 (37.4)	52 (37.7)	
Have a job but not working	15 (5.7)	6 (4.9)	9 (6.5)	
Unemployed, looking for work	62 (23.8)	29 (23.6)	33 (23.9)	
Unemployed, not looking for work	16 (6.1)	6 (4.9)	10 (7.2)	
Full-time homemaker	30 (11.5)	23 (18.7)	7 (5.1)	
In school	24 (9.2)	9 (7.3)	15 (10.9)	
Disabled, unable to work	12 (4.6)	2 (1.6)	10 (7.2)	
Other	3 (1.1)	1 (0.8)	2 (1.4)	
Acculturation				< .001
Marin_1	41 (15.7)	41 (34.5)	0 (0.0)	
Marin_2	44 (16.9)	44 (37.0)	0 (0.0)	
Marin_3	168 (64.4)	34 (28.6)	134 (100.0)	
Alcohol use (drinks per week) Mean (SD)	14.00 (29.53)	8.08 (11.09)	19.31 (38.63)	.004
Smoking				
No	143 (54.8)	82 (66.7)	61 (44.2)	
Yes	118 (45.2)	41 (33.3)	77 (55.8)	<.001

Aim 1, research question 2:

- What are the alcohol use reduction outcomes (drinks per week) of Hispanic women versus non-Hispanic women in the study sample over time?

Descriptive statistics were computed for Hispanic (n = 120) and non-Hispanic (n = 128) women in the study sample across three time points (baseline, 3 months, and 9 months) and are reported as drinks per week. The mean number of drinks per week were higher for non-Hispanic women than Hispanic women at all three time points (see Table 8).

Table 8

Average number of drinks per week at baseline, 3 months, and 9 months

	Hispanic (n = 120)	Non-Hispanic (n = 128)
Drinks per week (baseline) Mean (SD)	6.90 (10.33)	17.86 (36.28)
Drinks per week (3 months) Mean (SD)	5.45 (9.64)	13.37 (34.31)
Drinks per week (9 months) Mean (SD)	4.70 (8.28)	11.30 (28.04)

A repeated measures ANOVA was conducted to assess the impact of ethnicity (Hispanic, non-Hispanic) on alcohol consumption (as measured by drinks per week) across three time periods (baseline, 3 months, and 9 months). Mauchly's Test of Sphericity indicated that the assumption of sphericity had been violated, χ^2 (2) = 221.943, p <.001, therefore, the Greenhouse-Geisser correction was applied. There was no significant interaction between ethnicity and time, F (1.253, 308.306) = 2.007, p = .153. There was a significant main effect for time, F (1.253, 308.306) = 7.976, p = .003, with both groups showing a decrease in drinks per week consumed across three time periods. Bonferonni post-hoc analysis revealed that average drinks per week were significantly higher at baseline (M = 12.56 , SD = 27.54) than at 3 months (M = 9.54, SD = 25.80), and at 9 months (M = 8.11, SD = 21.17) and between 3 months (M = 9.54, SD = 25.80), and 9 months (M = 8.11, SD = 21.17). There was also a main effect comparing the two groups, F (1, 246) = 8.858, p = .035, suggesting an overall difference between the Hispanic and non-Hispanic women on drinks per week. Hispanic women consumed fewer drinks per week than non-Hispanic women.

Aim 1, research question 3:

- What are the contraceptive use outcomes (ratio of protected days/days of sex) of Hispanic women versus non-Hispanic women in the study sample over time?

A repeated measures ANOVA was conducted to assess the impact of ethnicity (Hispanic, non-Hispanic) on contraception use (ratio of protected days/days of sex) across three time periods (baseline, 3 months, and 9 months). Mauchly's Test of Sphericity indicated that the assumption of sphericity had been violated, χ^2 (2) = 259.002, p <.001, therefore, the Greenhouse-Geisser correction was applied. There was no significant interaction between ethnicity and time, F (1.174, 251.236) = 1.234, p = .275. There was no significant main effect for time, F (1.174, 251.236) = 3.645, p = .051. There was a main effect comparing the two groups, F (1, 214) = 5.059, p = .023, suggesting a difference between the Hispanic and non-Hispanic women. Hispanic women were more likely to use contraception than non-Hispanic women.

Aim 1, research question 4:

- How does the study sample of Hispanic women differ from the non-Hispanic women with regard to BSI symptom scales for anxiety, depression, and somatization over time?

A repeated measures ANOVA was conducted to assess the impact of ethnicity (Hispanic, non-Hispanic) on BSI subscales for depression, anxiety, and somatization across three time periods (baseline, 3 months, and 9 months). Mauchly's Test of Sphericity indicated that the assumption of sphericity had been violated, χ^2 (2) = 8.914, p = .012, therefore, the Greenhouse-Geisser correction was applied to depression scores. Mauchly's Test of Sphericity indicated that the assumption of sphericity had not been violated for anxiety, χ^2 (2) = 5.571, p = .062. Mauchly's Test of Sphericity indicated that the assumption of sphericity had been violated for somatization, χ^2 (2) = 10.998, p = .004, therefore, the Greenhouse-Geisser correction was applied. There was no significant interaction between ethnicity and depression, F (1.923, 421.128) = 0.073, p = .924; ethnicity and anxiety, F (2, 438) = 0.250, p = .779 or; ethnicity and

somatization, F (1.906, 417.462) = 2.108, p = .125. There was a significant main effect for time and depression, F (1.923, 421.128) = 21.592, p < .001; time and anxiety, F (2, 438) = 16.932, p < .001 and; time and somatization, F (1.906, 417.462) = 7.784, p = .001. Follow-up comparisons indicated that each pairwise difference for depression was significant, p <.05. Bonferonni post-hoc analysis revealed that depression subscale scores were significantly higher at baseline (M = 55.56, SD = 10.86) than at 3 months (M = 53.17, SD = 11.09) and at 9 months (M = 51.46, SD = 10.21) and between 3 months (M = 53.17, SD = 11.09) and 9 months (M = 51.46, SD = 10.21).

Bonferonni post-hoc analysis revealed that anxiety subscale scores were significantly higher at baseline (M = 53.82, SD = 11.63) than at 3 months (M = 51.17, SD = 11.31), but scores at 3 months were not significantly different than scores at 9 months (M = 50.11, SD = 10.37). Bonferonni post-hoc analysis revealed that somatization scores were significantly higher at baseline (M = 56.44, SD = 9.78) than at 3 months (M = 54.08, SD = 10.07) and at 9 months (M = 54.46, SD = 10.14). However, somatization scores were not significant between 3 months and 9 months. The main effect comparing the two groups' scores on the depression subscale was not significant, F (1, 219) = 1.989, p = .164, suggesting no difference between the Hispanic and non-Hispanic women. The main effect comparing the two groups' scores on the somatization subscale was not significant, F (1, 219) = 0.028, p = .868, suggesting no difference between the Hispanic and non-Hispanic women. There was a main effect comparing the two groups' scores on the anxiety, F (1, 219) = 5.284, p = .022. Non-Hispanic women endorsed significantly higher levels of anxiety Hispanic women.

Specific Aim 2: Examine the relationships between acculturation and mental health status for Hispanic women as measured by the BSI symptom scales for anxiety, depression, and somatization.

Specific Aim 2, research question 1:

- What is the relationship between acculturation and mental health status as measured by the BSI symptom scales for anxiety, depression, and somatization?

In order to test the hypothesis that women with higher levels of acculturation would have lower total scores on the BSI subscales for anxiety, depression, and somatization at baseline than women who were less acculturated, a one-way between subjects ANOVA was conducted. There was a significant effect of level of acculturation on anxiety score, F (2, 250) = 4.787, p = .009. Highly acculturated women endorsed higher levels of anxiety than women who were less acculturated. There was not a significant effect of level of acculturation on depression score, F (2, 250) = 2.467, p = .087. There was not a significant effect of level of acculturation on somatization score, F (2, 250) = 1.081, p = .341. A summary of the ANOVA for BSI anxiety, depression, and somatization subscale score between levels of acculturation can be found in Table 9.

Table 9

Summary of ANOVA for anxiety, depression, and somatization BSI subscales compared by level of acculturation (Marin 1, 2, and 3)

	Sum of Squares	Df	Mean Square	F
Anxiety				
Between Groups	1263.65	2	631.822	4.787*
Within Groups	32994.10	250	131.98	
Total	34257.75	252		
Depression				
Between Groups	599.57	2	299.78	2.467
Within Groups	30384.29	250	121.54	
Total	30983.86	252		
Somatization				
Between Groups	225.20	2	112.60	1.081
Within Groups	26033.50	250	104.13	
Total	26258.70	252		
*p <.01				

Specific Aim 3: Examine relationships between acculturation and TTM constructs.

Specific Aim 3, research question 1:

- What is the relationship between acculturation and the TTM constructs: experiential and behavioral processes of change, decisional balance (pros and cons for change); temptation; and confidence for alcohol, tobacco, and contraception use?

Experiential processes of change

A repeated measures ANOVA was conducted to assess the impact of acculturation level (Marin 1, 2, or 3) on experiential processes of change for alcohol, tobacco, and contraception use across three time periods (baseline, 3 months, and 9 months). Mauchly's Test of Sphericity indicated that the assumption of sphericity had been violated, $\chi^2(2) = 15.748$, $p < .001$, therefore, the Greenhouse-Geisser correction was applied to experiential processes of change for alcohol

use. Mauchly's Test of Sphericity indicated that the assumption of sphericity had not been violated for experiential processes of change for tobacco use, χ^2 (2) = 1.761, p = .414. Mauchly's Test of Sphericity indicated that the assumption of sphericity had been violated for experiential processes of change for contraception, χ^2 (2) = 11.251, p = .004, therefore, the Greenhouse-Geisser correction was applied. There was no significant interaction between acculturation level and experiential processes of change for alcohol use, F (3.728, 389.592) = 0.468, p = .746; acculturation level and experiential processes of change for tobacco use, F (4, 150) = 1.053, p = .382 or; acculturation level and experiential processes of change for contraception use, F (3.803, 403.070) = 0.281, p = .882. There was a significant main effect of time for the experiential processes of change for alcohol use, F (1.864, 389.592) = 3.606, p = .031, and for the experiential processes of change for contraception use, F (1.901, 403.070) = 21.522, p < .001. Bonferonni post-hoc analysis revealed that experiential processes of change for alcohol were significantly lower at baseline (M = 2.11, SD = 0.83) than at 3 months (M = 2.23, SD = 0.87) but were not significantly different between baseline and 9 months (M = 2.22, SD = 0.95) or 3 months and 9 months. Bonferonni post-hoc analysis revealed that experiential processes of change for contraception were significantly lower at baseline (M = 2.81, SD = 0.92) than at 3 months (M =3.13, SD = 0.96) and from baseline to 9 months (M = 3.20, SD = 0.91) but not significant when comparing 3 months to 9 months. There was not a significant main effect of time for experiential processes of change for tobacco use, F (2, 150) = 0.739, p = .480. The main effect comparing the levels of acculturation on experiential processes for alcohol use were significant, F (2, 209) = 4.013, p = .019. Women who were highly acculturated were more likely on average to endorse more use of experiential processes of change for alcohol use. There was not a main effect comparing the levels of acculturation on experiential processes of change for

tobacco use, F (2, 75) = 1.445, p = .242, or experiential processes of change for contraception use, F (2, 212) = 1.069, p = .345, suggesting that there is not a difference based on level of acculturation.

Behavioral processes of change

A repeated measures ANOVA was conducted to assess the impact of acculturation level (Marin 1, 2, or 3) on behavioral processes of change for alcohol, tobacco, and contraception use across three time periods (baseline, 3 months, and 9 months). Mauchly's Test of Sphericity indicated that the assumption of sphericity had not been violated for behavioral processes of change for alcohol, χ^2 (2) = 5.986, p = .050. Mauchly's Test of Sphericity indicated that the assumption of sphericity had not been violated for behavioral processes of change for tobacco use, χ^2 (2) = 0.989, p = .656. Mauchly's Test of Sphericity indicated that the assumption of sphericity had been violated for behavioral processes of change for contraception, χ^2 (2) = 6.073, p = .048, therefore, the Greenhouse-Geisser correction was applied. There was no significant interaction between acculturation level and behavioral processes of change for alcohol use, F (4, 418) = 0.644, p = .631; acculturation level and behavioral processes of change for tobacco use, F (4, 150) = 1.771, p = .138 or; acculturation level and behavioral processes of change for contraception use, F (3.889, 410.304) = 0.811, p = .515. There was a significant main effect of time for the behavioral processes of change for alcohol use, F (2, 418) = 4.630, p = .010. Bonferonni post-hoc analysis revealed that behavioral processes of change for alcohol were significantly lower at baseline (M = 2.27, SD = 0.77) than at 3 months (M = 2.41, SD = 0.83) and at 9 months (M = 2.44, SD = 0.91) but not significantly different between 3 months and 9 months. There was not a significant main effect of time for behavioral processes of change for tobacco, F (2, 150) = 2.770, p = .066, or contraception use, F (1.945, 410.304) = 1.298, p = .274.

The main effect comparing the levels of acculturation on behavioral processes of change for alcohol use was significant, F (2, 209) = 7.621, p = .001. Highly acculturated women were more likely on average to endorse more behavioral processes of change for alcohol use. The main effect comparing the levels of acculturation on behavioral processes of change for tobacco use were also significant, F (2, 75) = 4.366, p = .016. Highly acculturated women were more likely on average to endorse more use of behavioral processes of change for tobacco use. There was not a main effect comparing the levels of acculturation on behavioral processes of change for contraception use, F (2, 211) = 1.864, p = .158, suggesting that there is not a difference based on level of acculturation.

Decisional balance (pros for change)

A repeated measures ANOVA was conducted to assess the impact of acculturation level (Marin 1, 2, or 3) on pros for change for alcohol, tobacco, and contraception use across three time periods (baseline, 3 months, and 9 months). Mauchly's Test of Sphericity indicated that the assumption of sphericity had not been violated for pros for change for alcohol, χ^2 (2) = 1.881, p = .391. Mauchly's Test of Sphericity indicated that the assumption of sphericity had not been violated for pros for change for tobacco use, χ^2 (2) = 0.291, p = .865. Mauchly's Test of Sphericity indicated that the assumption of sphericity had been violated for pros for change for contraception, χ^2 (2) = 7.103, p = .029, therefore, the Greenhouse-Geisser correction was applied. There was no significant interaction between acculturation level and pros for change for alcohol use, F (4, 404) = 1.217, p = .303; acculturation level and pros for change for tobacco use, F (4, 150) = 1.501, p = .205 or; acculturation level and pros for change for contraception use, F (3.871, 406.419) = 1.257, p = .287. Likewise, there was no significant main effect of time for pros for change for alcohol use, F (2, 404) = 1.297, p = .275, pros for change for tobacco, F (2,

150) = 0.024, p = .976, or contraception use, F (1.935, 406.419) = 1.708, p = .184. The main effect comparing the levels of acculturation on pros of change for alcohol use was significant, F (2, 202) = 15.003, p < .001. Highly acculturated women were more likely on average to endorse more pros for change for alcohol. The main effect comparing the levels of acculturation on pros of change for contraception use was also significant, F (2, 210) = 3.487, p = .032. Women who were more acculturated, particularly those in Marin category 2, were more likely to report more pros for change for contraception than less acculturated women. There was not a main effect comparing the levels of acculturation on pros for change for tobacco use, F (2, 75) = 1.775, p = .177, suggesting that there is not a difference based on level of acculturation.

Decisional balance (cons for change)

A repeated measures ANOVA was conducted to assess the impact of acculturation level (Marin 1, 2, or 3) on cons for change for alcohol, tobacco, and contraception use across three time periods (baseline, 3 months, and 9 months). Mauchly's Test of Sphericity indicated that the assumption of sphericity had not been violated for cons for change for alcohol, χ^2 (2) = 2.973, p = .226. Mauchly's Test of Sphericity indicated that the assumption of sphericity had not been violated for cons for change for tobacco use, χ^2 (2) = 2.011, p = .366. Mauchly's Test of Sphericity indicated that the assumption of sphericity had not been violated for decisional balance (cons for change) for contraception, χ^2 (2) = 0.310, p = .856. There was no significant interaction between acculturation level and cons for change for alcohol use, F (4, 412) = 1.357, p = .248; acculturation level and cons for change for tobacco use, F (4, 150) = 0.347, p = .846 or; acculturation level and cons for change for contraception use, F (4, 422) = 2.208, p = .067. Likewise, there was no significant main effect of time for cons for change for alcohol use, F (2, 412) = 1.841, p = .160, cons for change for tobacco, F (2, 150) = 1.198, p = .305, or cons of

change for contraception use, F (2, 422) = 2.361, p = .096. The main effect comparing the levels of acculturation on cons of change for alcohol use were significant, F (2, 206) = 4.578, p = .011, suggesting a difference based on acculturation level. The main effect comparing the levels of acculturation on cons of change for tobacco use were also significant, F (2, 75) = 7.804, p = .001. Highly acculturated women were more likely to endorse more cons for change for tobacco use than women who were less acculturated. Similarly, there was a main effect comparing the levels of acculturation on cons for change for contraception use, F (2, 211) = 4.159, p = .017. Higher levels of acculturation were associated with more cons for change for contraception use.

Temptation

A repeated measures ANOVA was conducted to assess the impact of acculturation level (Marin 1, 2, or 3) on temptation for alcohol, tobacco, and contraception use across three time periods (baseline, 3 months, and 9 months). Mauchly's Test of Sphericity indicated that the assumption of sphericity had been violated for temptation for alcohol, χ^2 (2) = 144.900, p < .001, therefore, the Greenhouse-Geisser correction was applied. Mauchly's Test of Sphericity indicated that the assumption of sphericity had not been violated for temptation for tobacco use, χ^2 (2) = 3.087, p = .214. Mauchly's Test of Sphericity indicated that the assumption of sphericity had not been violated for temptation for contraception, χ^2 (2) = 1.585, p = .453. There was no significant interaction between acculturation level and temptation for alcohol use, F (2.669, 281.629) = 0.881, p = .441; acculturation level and temptation for tobacco use, F (4, 148) = 0.836, p = .505 or; acculturation level and temptation for contraception use, F (4, 416) = 0.099, p = .983. There was a significant main effect of time for temptation for alcohol use, F (1.885, 391.422) = 8.527, p < .001. Temptation for alcohol use decreased among all groups. Bonferonni post-hoc analysis revealed that temptation for alcohol was significantly higher at baseline (M =

2.80, SD = 0.96) than at 3 months (M = 2.56, SD = 1.01) and at baseline compared to 9 months (M = 2.45, SD = 1.02). However, there was no significant difference between 3 months (M = 2.56, SD = 1.01) and 9 months (M = 2.45, SD = 1.02). There was also a significant main effect of time for temptation for tobacco use, F (2, 148) = 3.311, p = .039. Temptation for tobacco use decreased among all groups. Bonferonni post-hoc analysis revealed that temptation for tobacco was significantly higher at baseline (M = 3.53, SD = 0.99) than at 3 months (M = 3.19, SD = 1.29) but not significant when comparing baseline to 9 months (M = 3.33, SD = 1.30) or when comparing 3 months to 9 months. There was no significant main effect of time for temptation for contraception use, F (2, 416) = 0.808, p = .446. The main effect comparing the levels of acculturation on temptation for alcohol use was significant, F (2, 211) = 10.349, $p < .001$. Highly acculturated women were more likely to endorse higher levels of temptation for alcohol use than women who were less acculturated. The main effect comparing the levels of acculturation on temptation for tobacco use was also significant, F (2, 74) = 6.470, p = .003. Highly acculturated women were more likely to endorse higher levels of temptation for tobacco use than women who were less acculturated. There was not a main effect comparing the levels of acculturation on temptation for contraception use, F (2, 208) = 2.594, p = .077, suggesting that there is not a difference based on level of acculturation.

Confidence

A repeated measures ANOVA was conducted to assess the impact of acculturation level (Marin 1, 2, or 3) on confidence for alcohol, tobacco, and contraception use across three time periods (baseline, 3 months, and 9 months). Mauchly's Test of Sphericity indicated that the assumption of sphericity had been violated for confidence for alcohol, χ^2 (2) = 12.680, p = .002, therefore, the Greenhouse-Geisser correction was applied. Mauchly's Test of Sphericity

indicated that the assumption of sphericity had not been violated for confidence for tobacco use, χ^2 (2) = 0.006, *p* = .997. Mauchly's Test of Sphericity indicated that the assumption of sphericity had not been violated for confidence for contraception use, χ^2 (2) = 1.530, *p* = .465. There was no significant interaction between acculturation level and confidence for alcohol use, *F* (3.778, 396.650) = 0.817, *p* = .509; acculturation level and confidence for tobacco use, *F* (4, 150) = 1.840, *p* = .124 or; acculturation level and confidence for contraception use, *F* (4, 416) = 0.510, *p* = .728. There was not a significant main effect of time for confidence for alcohol use, *F* (1.889, 396.650) = 2.997, *p* = .054. There was not a significant main effect of time for confidence for tobacco use, *F* (2, 150) = 2.441, *p* = .091. There was no significant main effect of time for confidence for contraception use, *F* (2, 416) = 2.562, *p* = .078. The main effect comparing the levels of acculturation on temptation for alcohol use was not significant, *F* (2, 210) = 0.756, *p* = .471, suggesting that there is no difference based on acculturation level. The main effect comparing the levels of acculturation on confidence for contraception use was not significant, *F* (2, 208) = 0.485, *p* = .617, suggesting that there is not a difference based on level of acculturation. The main effect comparing the levels of acculturation on confidence for tobacco use was significant, *F* (2, 75) = 3.705, *p* = .029. Highly acculturated women reported lower levels of confidence for tobacco use than women who were less acculturated.

Chapter 5: Discussion and Conclusion

Prenatal substance use, particularly the use of alcohol and tobacco, can have significant health effects on a developing fetus. CHOICES Plus is an evidence-based intervention that has been shown to reduce the risk of alcohol-exposed pregnancy (AEP) and tobacco-exposed pregnancy (TEP). The parent CHOICES Plus study was conducted in one of the most diverse cities in the U.S., Houston, TX, and included a substantial number of participants that identified as Hispanic. Previous studies have not exclusively focused on the relationship between acculturation and decisions about alcohol, tobacco, and contraception use. This study addressed many gaps, including whether there were differences between Hispanic and non-Hispanic women and whether lower or higher levels of acculturation were associated with differences in mental health status and Transtheoretical Model of Change (TTM) constructs.

The study was primarily driven by the Transtheoretical Model of Change (TTM), an integrative framework for understanding the elements involved in making behavioral changes. Additionally, given the complexity of examining individual and culturally-bound concepts, the social cognitive theory (SCT) and social ecological models (SEM) were also utilized to provide a more comprehensive appreciation of the role of ethnicity and acculturation in behavior change. Additionally SCT and TTM frameworks are often combined and serve as the basis for many behavioral change interventions (Benitez et al., 2015). The use of the TTM has been supported when used exclusively with certain subsets of the Hispanic population, including Mexican American women enrolled in a weight-loss program (Surís, del Carmen Trapp, Diclemente, & Cousins, 1998) and in a smoking cessation program (Keller & McGowan, 2001). Social Cognitive Theory (SCT) was useful in terms of understanding the impact of self-efficacy as well as the environment on behavior change. The model has been used as the conceptual framework for HIV risk reduction interventions (Peragallo, Gonzalez-Guarda, McCabe, & Cianelli, 2012)

and physical activity interventions (Benitez et al., 2015; Ickes & Sharma, 2012). Although Hispanic women have participated in studies related to alcohol and contraception use, I was unable to locate any recent studies that were done exclusively with a sample similar to the one in the present study. For a broader contextual perspective, including the impact of social and political environments, the Social Ecological Model (SEM) was included (Gruenewald, Remer, & LaScala, 2014).

This study generated seven main research findings: (1) both Hispanic and non-Hispanic women on average reduced their weekly alcohol consumption across three time points; (2) the average number of drinks per week across three time periods was significantly lower for Hispanic women than non-Hispanic women; (3) Hispanic women were more likely to have more protected sex than non-Hispanic women; (4) both Hispanic and non-Hispanic women showed reductions in BSI depression, anxiety, and somatization subscale scores across three time points; (5) non-Hispanic women were more likely to endorse higher levels of anxiety across three time points than Hispanic women; (6) higher level of acculturation was associated with higher baseline BSI anxiety subscale scores for non-Hispanic women but was not associated with differences in baseline scores for depression or somatization; (7) level of acculturation was associated with differences in all of the TTM constructs as follows: all groups (regardless of level of acculturation) demonstrated greater use of experiential processes of change for alcohol and contraception over time; higher level of acculturation was associated with greater use of experiential processes of change for alcohol but not for tobacco or contraception; all groups (regardless of acculturation) reported more behavioral processes of change for alcohol use over time; higher level of acculturation was associated with more behavioral processes of change for alcohol and tobacco but not for contraception; higher level of acculturation was associated with

higher pros for change for alcohol and contraception but not for tobacco use; higher level of acculturation was associated with more cons for change for alcohol, tobacco, and contraception use; all groups (regardless of acculturation) reported a decrease in temptation for alcohol and tobacco use across three time points; higher level of acculturation was associated with more temptation for alcohol and tobacco but not for contraception; higher level of acculturation was associated with higher confidence for tobacco use only.

SUMMARY AND DISCUSSION OF THE FINDINGS

Specific Aim 1. Describe the study sample.

Research question 1. How does the study sample of Hispanic women differ from the non-Hispanic women in terms of demographics, level of acculturation, smoking status, and baseline drinking?

The current study tested the hypothesis that Hispanic women would report less alcohol use (drinks per week) and be less likely to be smokers than non-Hispanic women. It is also hypothesized that Hispanic women would be more likely to be married or living with a partner and would report being less acculturated than non-Hispanic women. Results support the hypothesis that women who identified as Hispanic were less likely to use alcohol. They were also less likely to be current smokers, were less acculturated, and were more likely to be married or living with a partner. This is consistent with a similar study (Letourneau et al., 2017). Although being married or in a committed relationship may serve to reduce risk for immigration stress, important considerations such as a partner's substance use and incidence of intimate partner violence should be given consideration when providing interventions (Leonard & Eiden, 2007; Perreira & Cortes, 2006). Hispanic women have lower rates of smoking than non-Hispanic Whites; however, smoking prevalence has been known to differ based on national origin (Kondo,

Rossi, Schwartz, Zamboanga, & Scalf, 2016). Studies have also shown that Hispanic women who were more acculturated were more likely to report smoking during pregnancy (Detjen, Nieto, Trentham-Dietz, Fleming, & Chasan-Taber, 2007). As a result, Kondo et al., suggests that acculturation should be examined at the subgroup level. The majority of the women in the current study were of Mexican descent which could mean that differences in smoking behavior may have been different when examining other Hispanic groups, such as Puerto Ricans or South Americans.

Research question 2. What are the alcohol use reduction outcomes (drinks per week) of Hispanic women versus non-Hispanic women in the study sample over time?

The current study tested the hypothesis that Hispanic women will have greater reductions in alcohol use over time when compared to non-Hispanic women. Results support the hypothesis that Hispanic ethnicity is associated with less use of alcohol. However, as with smoking, the issue of acculturation and Hispanic subgroup also merits attention. Acculturation has been associated with hazardous drinking in women but not men and it has been recommended that alcohol interventions be tailored based on acculturation level and gender (Lee, Almeida, Colby, Tavares, & Rohsenow, 2016).

Research question 3. What are the contraceptive use outcomes (ratio of protected days/days of sex) of Hispanic women versus non-Hispanic women in the study sample over time?

The current study tested the hypothesis that Hispanic women will use less contraception when compared to non-Hispanic women. Results did not support the hypothesis that Hispanic women would be less likely to report use of contraception from baseline to 9 months. Hispanic women in the current study were significantly more likely to report use of contraception at all

time points when compared to the non-Hispanic women. This unexpected result can be interpreted in a couple of ways. In national samples, non-Hispanic White women, ages 15-44, were significantly more likely than Hispanic women and non-Hispanic Black women to use contraception. Older women (ages 35-44) were also more likely to report use of contraception (Daniels, Daugherty, & Jones, 2014). The present study contains a sample of women that is largely minority, supporting prevalence estimates showing similar rates between Hispanics and non-Hispanic blacks (Daniels et al., 2014; Goodman, Onwumere, Milam, & Peipert, 2017). Had the sample of women in the study contained more non-Hispanic White women, it is possible that reduction outcomes would have been lower, as expected. Additionally, it is also important to consider the incidence of unintended pregnancies and unintended births as it pertains to the need for prevention interventions targeting effective contraception use. In 2006, Hispanic women had the highest rate (45%) of unintended births compared to non-Hispanic blacks and (37%) and non-Hispanic Whites (18%) (Finer & Zolna, 2011). This finding may be associated with lower overall rates of abortion (Werth et al., 2015).

Research question 4. How does the study sample of Hispanic women differ from the non-Hispanic women with regard to BSI symptom scales for anxiety, depression, and somatization over time?

The current study tested the hypothesis that Hispanic women will have higher scores on the BSI subscales for anxiety, depression, and somatization. Results did not support the hypothesis that Hispanic women would be more likely to report higher anxiety subscale scores. This was a surprising finding given what is currently known about prevalence rates for anxiety. In the general population, women have higher prevalence rates of anxiety than men. Hispanic women also appear to experience a greater disease burden from anxiety, similar only to

European American men and European American women. According to McLean et al., these three groups were more likely to miss work, have more visits to the doctor, and receive more mental health or substance use specialist visits (McLean, Asnaani, Litz, & Hofmann, 2011). In this particular sample of non-Hispanic women, it is possible that marital status and employment status may have mediated the relationship between anxiety and Hispanic and non-Hispanic ethnicity. Given the finding of the current study, and the well-known positive correlation between anxiety and substance use (Kushner, Abrams, & Borchardt, 2000), it is important to consider the opportunity to intervene with women of reproductive age who may present to primary care or specialty care settings to assess risk for AEP, particularly women from lower socioeconomic groups which may be disproportionately affected by trauma or collective stressful life experiences (Myers et al., 2015). Screening for adverse childhood experiences (ACEs) in primary care may serve as a tool for gathering information about women who may be affected by childhood trauma (Kalmakis, Shafer, Chandler, Aponte, & Roberts, 2018). Furthermore, discussing issues related to mental health in the primary care setting may reduce the stigma commonly associated with these conditions (Gonzalez, Mejia de Grubb, & Zoorob, 2015).

Associations between ethnicity and BSI subscales for depression and somatization were not supported. This is consistent with data from the 2016 National Survey on Drug Use and Health which show that Hispanic and non-Hispanic Blacks have a lower prevalence of major depressive disorder than non-Hispanic Whites (Substance Abuse and Mental Health Services Administration, 2017). However, as previously noted, there are differences when looking at Hispanic subgroups. For example, Puerto Ricans have been shown to have higher rates of lifetime major depression than non-Hispanic Whites (González, Tarraf, Whitfield, & Vega, 2010). It may be that there is no relationship between Hispanic and non-Hispanic ethnicity and

scores on the depression and somatization subscales of the BSI. In turn, it may be that there is an association but the present study does not contain a large enough sample to detect a meaningful difference. A very important consideration when interpreting these data is that somatic symptoms are relatively common and relevant in ethnic minority groups, including African Americans and Hispanics (Nadeem, Lange, & Miranda, 2008).

Specific Aim 2. Examine relationships between acculturation and mental health status for the study sample as measured by the BSI symptom scales for anxiety, depression, and somatization.

In addition to exploring the association between Hispanic and non-Hispanic ethnicity and BSI symptom scales for anxiety, depression, and somatization, I was also interested in exploring the role of acculturation in these scores.

Research question 1. What is the relationship between acculturation and mental health status as measured the by BSI symptom scales for anxiety, depression, and somatization?

The current study tested the hypothesis that lower levels of acculturation are associated with higher anxiety, depression, and somatization subscale scores on the BSI. Results did not support the hypothesis that higher acculturation would be associated with higher scores on the BSI subscales for depression, anxiety, or somatization. There were significant differences between the levels of acculturation and anxiety score with those individuals identifying as highly acculturated having a greater BSI subscale score for anxiety. In this particular study, factors associated with lower socioeconomic status, such as household income, and differences in marital status (less cohabitation or marriage in the non-Hispanic group) may produce higher levels of anxiety for the women who identified as highly acculturated.

Specific Aim 3. Examine relationships between acculturation and TTM constructs.

Research question 1. What is the relationship between acculturation and the TTM constructs: experiential and behavioral processes of change; decisional balance (pros and cons for change); temptation; and confidence for alcohol, tobacco, and contraception use?

The current study tested the hypothesis that women who are more highly acculturated will report more use of TTM experiential and behavioral processes of change for tobacco, alcohol, and contraception use over time than women who are less acculturated. Results supported the hypothesis that more highly acculturated women were more likely to report experiential processes of change for alcohol use. Results did not support the hypothesis that there would be significant differences between acculturation level and experiential processes of change for tobacco and contraception use. Results supported the hypothesis that more highly acculturated women were more likely to report behavioral processes of change for alcohol and tobacco use. Results did not support the hypothesis that that women who were more highly acculturated would report more contraception use. Previous studies using the TTM have recommended that questions related to experiential processes of change be tailored to concepts that are important to the ethnic group, such as love of family (Hoke & Timmerman, 2011; Keller & McGowan, 2001).

Results supported the hypothesis that more highly acculturated women were more likely to report pros for change (on the decisional balance exercise) for alcohol and contraception. Results did not support the hypothesis that there would be significant differences between acculturation level and experiential processes of change for tobacco. A possible explanation for the differences in reporting pros for change for tobacco may have to do with the participants' stage of change, a variable that was not explored in this study. Previous studies have shown that people report fewer positive features of smoking as they progress to contemplation and

preparation stages (Keller & McGowan, 2001). Results supported the hypothesis that more highly acculturated women were more likely to report cons for change for alcohol, tobacco, and contraception use.

Results supported the hypothesis that more highly acculturated women would report more temptation for alcohol and tobacco use. With regard to alcohol use, this is a very relevant finding, as previous studies have suggested that temptation to drink alcohol was a predictor of prenatal drinking frequency (Chang, McNamara, Wilkins-Haug, & Orav, 2007). Results did not support the hypothesis that there would be significant differences between acculturation level and temptation for contraception use.

Results supported the hypothesis that more highly acculturated women were less likely to report being confident about not using tobacco. It is interesting to note that the group that reported the highest mean confidence score across all three time points were women in the Marin 2 category. Although the SASH does not formally consider a midway point to be indicative of biculturality (Marin et al., 1987), it may be useful to consider what these results may represent in light of criticism that acculturation scales are often too unidimensional (Hunt et al., 2004). Unfortunately, these data have limited generalizability, particularly for tobacco use behavior due to the small sample of smokers included in the analysis. Results also did not support the hypothesis that there would be significant differences between acculturation level and experiential processes of change for alcohol and contraception use.

LIMITATIONS

Although there were a number of significant findings, there were some limitations to the study. First, the present study utilized secondary data which was not initially collected for the purpose of answering the exact research questions posed by the researcher. Second, this study

looked specifically at Hispanic women in Texas without exploring the role of national origin; therefore, they may not be generalizable across subgroups or Hispanic women from other geographic areas. Despite a larger sample size compared to previous research, the sample of Hispanic women in the parent study is still limited. Nonetheless, Hispanic women were chosen for this study because of their relative underrepresentation in the current literature on AEP prevention. There is also a dearth of research that specifically examines the TTM constructs as they pertain to acculturation level in Hispanic women.

IMPLICATIONS FOR POLICY AND PRACTICE

Chapters 1 and 2 outlined important aspects of AEP and TEP prevention. To date, many of the large-scale prevention efforts that have taken place in the U.S. have been funded by the federal government. This includes, intervention development, public awareness, and training opportunities (DeVries & Waller, 2004; Floyd, Ebrahim, & Boyle, 1999; Weber, Floyd, Riley, & Snider Jr, 2002). However, in the past two years, one of the longest-standing federal centers on FASD lost its funding from the Substance Abuse and Mental Health Services Administration (SAMHSA). Although the CDC has re-committed funding to FASD prevention through its Practice and Implementation Centers and National Partnerships cooperative grants (Fox et al., 2015), it is important to be mindful of the reality that funding will not continue in perpetuity. Practitioners and policy makers have a responsibility in the translation of research to practice. Practitioners who have received training on evidence-based AEP prevention, identification, and treatment strategies can be instrumental in their implementation, sustainability, and efficacy in health care and community settings. Policy makers at all levels have a pivotal role in advocating for improvements to prevention strategies based on the best available evidence, promotion of evidence-based interventions, and the development of policies that ensure access and availability

to needed resources rather than punitive legislation. The current study showed several differences associated with Hispanic ethnicity and acculturation level when exploring decisions about health behavior change, an important consideration for the development of policy and practice guidelines. Implications for policy and practice are examined below.

POLICY IMPLICATIONS

Public policy. On the federal level, public policy related to alcohol and pregnancy has largely been focused on universal prevention measures, most notably the Surgeon General's Advisory and the requirements of the Alcoholic Beverage Labeling Act of 1988. Both measures allow for the broad dissemination of prevention messages and information about the risks associated with drinking during pregnancy. Currently, labels on alcoholic beverages in the U.S. are only required to be the official language, English. These two policies will be described briefly in the section below.

Efforts at the state level vary but often involve the issuing of gubernatorial proclamations related to FASD and training and education activities provided by State Departments of Health or Developmental and Intellectual Disabilities. In the State of Texas, the Department of State Health Services created a public-private entity whose main focus has been on FASD (Johnson et al., 2015); however, they were dissolved in 2017 and are no longer under the Department. Unfortunately, not all state policies have been positive. In recent years, there has been a flurry of legislative activity aimed at punishing women or mandating them to care if they give birth to a child that is determined to have been exposed to alcohol prenatally (Schroedel & Fiber, 2001). These issues will be discussed further below.

Surgeon General's Advisory. In 1981, nearly a decade after FAS appeared in the U.S. medical literature, the Surgeon General issued an advisory to pregnant women and women

considering pregnancy regarding the consumption of alcoholic beverages (Grant et al., 2009). The warning advised women who were pregnant or considering pregnancy not to drink and to increase their awareness about foods and drugs that may contain alcohol. The advisory was issued again in 1990 and 1995. Although the message was clear, the ensuing report to Congress focused on the amount and timing of alcohol consumption. This discrepancy is believed to have been misinterpreted by the public as suggesting that pregnant women limit amount of alcohol they consume. In the early 2000s, Dr. Richard Carmona, reissued the advisory with an explicit message that there is no known safe amount of alcohol during pregnancy and that the effects of prenatal alcohol exposure can be experienced by the fetus at any stage of pregnancy (Carmona, 2004).

The alcoholic beverage labeling act (ABLA). The Alcoholic Beverage Labeling Act (ABLA) is a U.S. federal legislation enacted in 1988 and mandates that a government warning statement appear on all alcoholic beverage containers sold and distributed in the U.S (Jacobs, 1989). It makes it unlawful for any person to manufacture, import, or bottle for sale or distribution in the United States any alcoholic beverage unless the container of such beverage bears the following statement:

> GOVERNMENT WARNING: (1) According to the Surgeon General, women should not drink alcoholic beverages during pregnancy because of the risk of birth defects. (2) Consumption of alcoholic beverages impairs your ability to drive a car or operate machinery, and may cause health problems. (p. 1223)

While labels on alcoholic beverages do seem to increase knowledge about the risks of drinking during pregnancy, their effectiveness in promoting abstinence among pregnant women has not been shown (Thomas, Gonneau, Poole, & Cook, 2014). Furthermore, although few

studies exist that examine the effect of these labels on alcohol use by Hispanic women, early research shows that women who are more acculturated demonstrated a greater awareness of warning messages for wine and beer, creating an opportunity to promote a preventive message among Hispanic women (Marin & Gamba, 1997).

***Punitive legislation*.** Policies and legislation that criminalize alcohol use during pregnancy may deter a woman from seeking help or talking with her health care provider about her use. In some states, laws require health care providers to inform law enforcement when a newborn is determined to have been affected by prenatal alcohol exposure. In the case of Washington, D.C., health care providers must report when a child under the age of one has been diagnosed with an FASD to the District's Child and Family Services Agency (Senturias & Baldonado, 2014). This issue is further complicated for women who are undocumented or living with partners or family members who are undocumented. These women may not seek prenatal care or disclose information about substance use out of fear that they, or their families, will face legal consequences (Kalofonos & Palinkas, 1999).

Organizational policy. The gap from research to practice is evident among many evidence-based interventions, including screening and brief intervention (Babor & Higgins-Biddle, 2000). A number of barriers and facilitators have been identified, including the positive role that policy can have in maintaining efforts (Johnson, Jackson, Guillaume, Meier, & Goyder, 2010). Human service organizations and health care systems are well positioned to reduce the prevalence of AEP in their patients, clients, and consumers. Organizational leadership can champion universal screening and evidence-based prevention interventions through the development of policies and procedures that support their long-term sustainability. Policies in support of AEP prevention need to contain a clear rationale, guidelines for implementation, and

ways to evaluate their success. Organizational policy should also explain how to collect process and outcome data and encourage its staff to disseminate their findings to others. Furthermore, organizations can negotiate contracts and business agreements that allow for the reimbursement of preventive services (Fussell, Rieckmann, & Quick, 2011). Training for providers and medical staff providing services to Hispanic women should be culturally relevant and resources should be made available in Spanish as needed.

PRACTICE IMPLICATIONS

Service delivery. Health care and social service providers encounter women of reproductive age on a regular basis. At times, these encounters occur in isolation from other professionals. However, recent health care reform has paved the way for greater integration of behavioral and physical health services. Integrated health creates a more streamlined process for identifying and managing co-occurring health and mental health needs from both the preventive and treatment standpoints (Gonzalez et al., 2015). Behavioral health practitioners can work alongside medical providers to screen and provide brief treatment and brief intervention as needed. Complementary approaches such as CHOICES Plus effectively combine the knowledge and skills of professionals from two distinct groups to deliver preventive services to women at risk for an alcohol-exposed pregnancy.

When integration is not possible or available, several other approaches, including SBIRT, can be utilized to ensure that appropriate referrals to specialty care are made when a woman is drinking at risky or dependent levels. When considering implementation of these interventions, it is important to consider the needs of minority women, including common cultural and linguistic barriers (even when a women can speak some English) (Brach & Fraserirector, 2000; David & Rhee, 1998). Betancourt and colleagues developed a cultural competence framework to address

the issue of racial and ethnic disparities in health care and recommend that interventions be developed with the following constructs in mind: organizational cultural competence (i.e., a diverse workforce and leadership), structural cultural competence (i.e., structural processes of care such as interpreter services and translated health education materials), and clinical cultural competence (i.e., augmenting provider knowledge and skills related to sociocultural factors and health) (Betancourt, Green, Carrillo, & Owusu Ananeh-Firempong, 2003). Such considerations can positively affect service delivery.

Primary and secondary prevention. The importance of primary and secondary prevention of AEP and FASD has been discussed at length throughout this dissertation. It has also been mentioned that universal adoption in many settings has not yet occurred. Numerous evidence-based prevention interventions have been described and analyzed. Practitioners working in a multitude of settings will encounter women of childbearing age who may be at risk for an AEP due to behaviors prior to and after becoming pregnant. As our society takes greater interest in the prevention of disease and the reduction of disease burden, it is imperative that health and human service professionals become trained in delivering evidence-based prevention interventions, including culturally-responsive interventions to Hispanic women (Betancourt et al., 2003). Prevention strategies can be applied in the context of treatment of related conditions or as a component of comprehensive wellness services. Creating a safe and non-judgmental environment for women to discuss alcohol use during pregnancy and implementing a universal screening and counseling program for pregnant women can go a long way in preventing the harms associated with prenatal alcohol use.

Cultural considerations. The AEP prevention interventions described in Chapter 2 included women from varied groups, including racial and ethnic minorities, and women

throughout the spectrum of reproductive years. These women were recruited from diverse settings and were also diverse in terms of other demographic characteristics such as marital status, employment status, and socioeconomic and income levels. Despite the wide representation of participants across most of the studies, few have focused exclusively on certain large minority groups, such as Hispanic women of reproductive age. One CHOICES study focused on Hispanic women but had a very small sample size (n = 89) (Letourneau et al., 2017). Cultural adaptations of SBI and SBIRT have been tested and found effective in reducing risky drinking among Hispanic day laborers, college students, and heavy drinkers; however, the percentage of women in these studies is very small (Lee et al., 2013; Ornelas, Allen, Vaughan, Williams, & Negi, 2015; Satre, Manuel, Larios, Steiger, & Satterfield, 2015; Vaughan, Chang, Escobar, & Dios, 2015). Lower drinking rates have been associated with Hispanic women with low levels of acculturation (McCabe, Schaefer Solle, Peragallo Montano, & Mitrani, 2017). However, there is a growing body of literature that shows that highly acculturated Hispanic women drink as much or more than their male counterparts (Caetano, Ramisetty-Mikler, Wallisch, McGrath, & Spence, 2008). Changes in drinking patterns across minority populations should be considered when delivering selective or indicated prevention strategies. Further, interventionists and other providers who are working with Hispanic women should take into account cultural, religious, and familial values as they pertain to the use of contraception (Martinez & Orpinas, 2016). In conclusion, practitioners are important allies in the prevention of FASDs. It is incumbent upon them to implement evidence-based prevention interventions in their practice settings with attention to the needs and preferences of Hispanic women, particularly those who may be at greater risk as a result of the narrowing gap between highly acculturated Hispanic women and non-Hispanic White women.

CONCLUSION

Women of reproductive age who drink and are not using effective contraception are at risk for an AEP. This dissertation identified other factors that place women at an elevated risk, including pre-pregnancy consumption levels, concurrent illicit drug use, and exposure to violence. These epidemiological conclusions illustrate the need for comprehensive prevention efforts at all levels. Given the dearth of studies conducted with larger samples of Hispanic women and the absence of articles focused specifically on the role of acculturation, this dissertation explored numerous factors that might be associated with differences between groups. As noted previously, it is also important to consider acculturation within the Hispanic population. A number of theoretical frameworks have served as a basis for the development of prevention interventions, including Social Cognitive Theory, the Social Ecological Model, and the Transtheoretical Model, and have been applied to the understanding of behavior change for Hispanic women. Today, researchers, health and human service professionals, and policy-makers have a bevy of evidence to inform their work and efforts to reduce the prevalence of the number one preventable cause of developmental disabilities. Evidence-based prevention interventions, such as CHOICES Plus and screening and brief intervention (SBI) have been shown to be effective in reducing the risk of AEP. Both interventions and their counterparts can be carried out in a variety of settings and with women from diverse backgrounds, including Hispanic women.

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